

TROPICAL DISEASE BULLETIN.

1947.

LEISHMANIASIS IN GREECE.*

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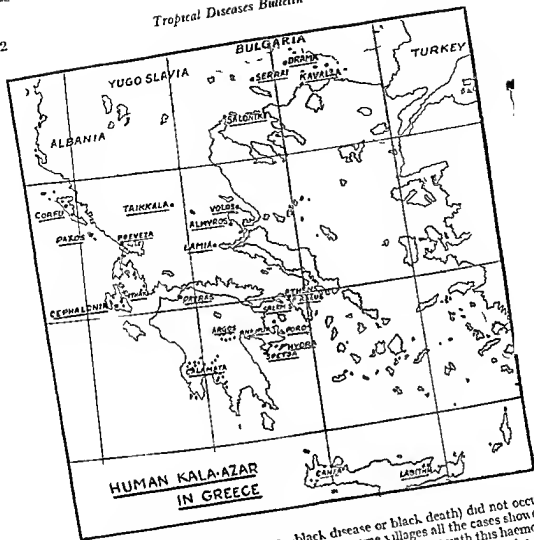
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In Greece human visceral leishmaniasis, canine leishmaniasis and oriental sore are endemic and, curiously enough, coexist, in some districts, at the same place.

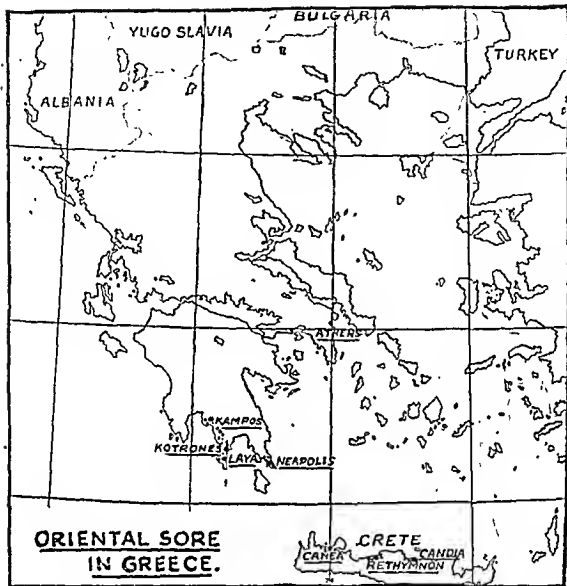
Kala azar.—New foci are constantly being discovered. The widest endemic focus now seems to be in Messinia (ADAMOPOULOS, 1926; JOANNIDÈS, 1926; MATARANGAS, 1927; COPANARIS, 1935; PAPANTONAKIS, 1937) in the Peloponnese. Other cases from the Peloponnese are found in Argos (KIRIDILIDIS, 1938), villages of Argolis (KIRIDILIDIS, 1938), Nauplia (CARDAMATIS, 1912; KIRIDILIDIS, 1938), Patras (CARDAMATIS, 1912), in Poros (CAMINOPETROS, 1934) and the islands Spetsai and Hydra (CARDAMATIS, 1912; MATARANGAS, 1927; IGNOUS, 1932; COPANARIS, 1935) which are in the vicinity. Still other foci exist in the neighbourhood of Athens (CARDAMATIS, 1912; MATARANGAS, 1927; SPYROPOULOS, 1928; CAMINOPETROS, 1934; COPANARIS, 1935), Piræus (CARDAMATIS, 1912) and Salamis (PANGALOS, 1929) and in the Ionian Islands—Corfu, Cephalonia (DIWARIS, 1914), Ithaca and Paxoi. Inside and in the neighbourhood of Preveza (MATARANGAS, 1927), in Lamia (MATARANGAS, 1927), Thessaly—Volos, Trikkala, Almyros (CARDAMATIS, 1912; COPANARIS, 1935)—Macedonia—Salonica, Drama, Serres, Kavalla, as well as in villages of Western Macedonia (ALEXANDRIDES, 1929)—and more especially in Crete—Anaea, Lasithi (MATARANGAS, 1927; COPANARIS, 1935; PAPANTONAKIS, 1935, 1936; MAYER and MALAMOS, 1936; ADLER, THEODOR and WITENBERG, 1938). *Kala azar* in Greece is a children's disease, as in other Mediterranean countries. Children are infected usually during the first four years of life, but we have also cases in older children and even in adults. It is not rare to trace two or more cases of this disease in the same house. The clinical picture includes the familiar symptoms, namely: a persistent, atypical fever, great enlargement of the spleen and the liver, emaciation, hypochromic anaemia, leucopenia, sometimes a haemorrhagic diathesis of the skin and the mucous membranes, and dysenteric disorders. The dark pigmentation of the skin, which has given

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to the disease its name (kala azar—black disease or black death) did not occur in all our cases. It is strange to note that in some villages all the cases showed skin haemorrhages and that in neighbouring villages not one with this haemorrhagic diathesis was encountered (MALANOS 1947). It is interesting also to note that in a case with a clinical appearance like Banti's syndrome CAWADIAS, at the post mortem examination found the parasites not only in the spleen and the liver but also in the wall of the splenic vein.

Diagnosis is made by demonstration of *Leishmania donovani* by puncture with a syringe. Liver and lymph gland punctures are seldom used and we prefer punctures of the spleen or the sternum. It must be emphasized that often in the bone marrow a few parasites only were detected after long search, and that sometimes they were even absent. Most physicians use for spleen puncture the Arizantinos syringe which has the advantage of quick withdrawal of the splenic tissue owing to the adjusted spring which allows the automatic retraction of the piston. We favour this serological diagnostic method because of the more accurate results given by the detection of the *L. donovani*. Others favour the serologic methods and PHINOS (1932) prefers Chopra's test with a 4 per cent Neostibosan solution. CAMINOPELOS (1934) his sulpharsent test.

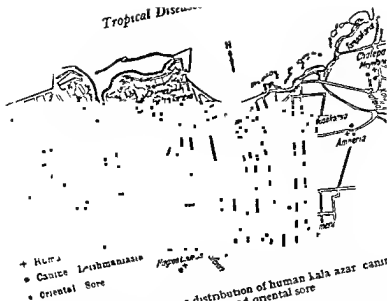


From the therapeutic point of view, in the cure of kala azar I must say that as in other Mediterranean countries, we use relatively higher doses of drugs than those used in Eastern Asia (PHINOS, 1932, MAYER and MALAMOS, 1936; MALAMOS, 1937).

Orien al sore—The skin manifestation of human leishmaniasis occurs more particularly in Crete (Department of Canea, Rethymnon, Candia) (COPANARIS, 1935; PAPANTONAKIS, 1935, 1936; MAYER & MALAMOS, 1936; MALAMOS, 1937; ADLER, THEODOR and WITENBERG, 1938) and also in Lakonia (in and around Neapolis, Kamos, Cotrones, Laya (JOANNIDÈS, 1926, BLANC and CAMINOPETROS, 1927)). Sporadic cases are found in various other districts of Greece and even in Athens (BLANC and CAMINOPETROS, 1928). In Crete and Lakonia, oriental sore often assumes an epidemic character, affecting the greater part of the population. As stated already, visceral leishmaniasis in Greece is always endemic; never epidemic.

Oriental sore is common to all ages, and affects more particularly the uncovered parts of the body. the face, the neck, the upper limbs; in women seldom the chest. The lower limbs are rarely affected in adults, but often in children. We had the opportunity to observe cases with only one sore, while in others one hundred or more sores could be found (DOUCAS, 1929).

Tropical Diseases



Plan of Canea showing distribution of human kala azar canine leishmaniasis and oriental sore

On the contrary in the peripheral regions of the town where the houses are of the bungalow type with small gardens and some vegetation human and canine visceral leishmaniasis are common Here 49 per cent of the sandflies examined were *P. major* 45 per cent *P. papatasi* and only 6 per cent *P. sergenti* (MAYER and MALAVOS 1936)

Let us hope that by the measures taken against infected dogs as well as by the improvements in insecticides we shall be able to eradicate these diseases

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EXUDATE FROM MILLIPEDES WITH PARTICULAR REFERENCE TO ITS INJURIOUS EFFECTS.

By E. BURTT, Ph.D., D.I.C.

The general conception is that Centipedes (Chilopoda) and Millipedes (Diplopoda) are closely related. This view persists largely because in the old scheme of classification they were placed together as orders in the same class—the Myriapoda. For convenience both continue to be treated under this head in the Zoological Record and in such standard works as the revised edition of PARKER and HASWELL (1940). However, in modern practice, they are recognized as being so widely divergent zoologically as to merit being regarded as distinct classes of the Arthropoda—having no more connexion with one another than have, for example, the Arachnida and the Insecta (KÜENTHAL and KRUMBACH 1926-1927, PATTON and EVANS 1929). Centipedes are carnivorous, while millipedes are vegetarian feeders. The painful bites which some of the former (e.g. *Scolopendra*) can inflict are well known. In their case, venom produced from a gland in each of the two poison-jaws, is introduced into the victim through a pore near their apices in the act of biting. In certain species the poison glands are too large to be contained in the poison jaw and are situated in the abdominal segments. Many centipedes of the order Geophilomorpha have the chitinous disc of the ventral part of each segment pierced by very fine pores. These are the openings of unicellular glands from which odorant liquids having phosphorescent or venomous properties may be secreted (PHISALIX 1922). PATTON (1931) refers to *Olostigmus lineatus** as a common pest in Tonkin. During the daytime it hides in cracks and crevices in walls and

* This species is attributed by Patton to the Diplopoda. Nevertheless other authorities (e.g. Attems, 1926-1930) place it in the Chilopoda, order Scolopendromorpha.

only comes out at night. It is said to crawl up on to a bed and owing to its small size to pass easily through the mesh of a mosquito curtain. As soon as it is touched it emits a phosphorescent vesicant fluid which is reputed to cause painful blisters. However since *O. lineatus* Hasse 1887 has a length up to 45 mm (ATTEMS 1930) and phosphorescence does not appear to be known among the Scolopendromorpha (VERHOEFF 1902 1925 PHISALIX loc cit ATTEMS 1926-1930 KOCH 1927) it would appear that the identification was in re

th impunity. Nonetheless certain peoples in the natives regard the Diplopoda are provided with no mechanism with which to inoculate poison the majority are possessed of the defensive power of exuding repugnatorial fluid from segmentally arranged glands (WHITTICK 1943). The fact that contact with this fluid may cause injury of a serious nature is not widely recognized. Few authenticated instances are known. This opportunity is taken to assemble data on the subject.

Diplopoda are divided into two sub-classes—Pselapognatha and Chilognatha. The former are a small group of inconspicuous soft bodied creatures devoid of repugnatorial glands and so do not concern us. The great majority of millipedes belong to the Chilognatha. These have the chitinous covering of the body strengthened with calcareous matter and repugnatorial glands are usually present. They include such diverse forms as Glomerids (Pill millipedes), Polydesmids (flat backed millipedes) and the Juliformia (ATTEMS 1926-1930)—the order millipedes is familiar even to books on the subject. These creatures have a hard casing, are long and

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foramen leads by a narrow channel to a multicellular retort shaped gland which is embedded and fixed amongst the tissues in the side of the segment concerned. Each segment with foramina thus possesses two glands for possess no contractile elements in their arently due entirely to its being under The channel connecting the glandsac is blocked by a stout grooved chitinous rod whose distal

* Not to be confused with wire worm as applied to larvae of click beetles (Elaterridae)

a channel on its dorsal side along which fluid (under pressure from within) can escape to the exterior.

Secretions from millipedes have long attracted attention on account of their colour and smell. Verhoeff states that the most frequent hues are yellow-brown or brown, but red, lemon-yellow, white, or clear and colourless examples also occur. There are forms in which the exudate appears to be gaseous (VERHOEFF). WAGA (1839) likened the smell from *Glomeris* to chlorine; some *Lysiopetaloides* smell of excrement or urine (VERHOEFF); *Polydesmids*, when stimulated, usually smell of bitter almonds or prussic acid (PHISALIX, VERHOEFF, WEBER 1882, COPE 1883, WHEELER 1890, BURTT 1938a, TURK 1945-1946). According to HARVEY (1940) certain *Polydesmids* have been described as luminous. In *Juliformia* the secretion has been described as lemon-yellow (VERHOEFF, LOOMIS 1941), yellow (SAVY 1823, Cope), yellow-brown or like iodine (Burt, Musgrave). Its smell is pungent. Thus COPE (1883) likened the odour from American species to that of aqua regia. PHISALIX (1900) thought the fluid from *Schizophyllum mediterraneum* smelled more like bromine than chlorine, without being identical with either, but subsequently BÉHAL and PHISALIX (1900) stated it was identical with quinone both as to smell and other properties. According to Verhoeff, VAUBEL in 1901 remarked

soluble in water, but more so in alcohol (PHISALIX 1900), the aqueous solution was neutral to litmus and the active principle distilled over readily, apparently unchanged (BÉHAL and PHISALIX). Similar properties were noted by FUHR (1903) in the case of German species. It stains the skin yellow, yellow-brown or reddish-brown, in this respect resembling closely the effect of iodine solution (Holl 1826 mentioned by Verhoeff; Burtt). The stains do not wash off (PHISALIX 1900) even after repeated application of soap and water (Verhoeff).

The defensive fluid usually just oozes from the repugnatorial foramina forming droplets along the sides of the body. This was first remarked by SAVY (1823), prior to whose observations these foramina were wrongly interpreted as tracheal openings (PHISALIX 1922). The fast-named author also mentions that in some tropical *Spirobolus* and *Spirostreptus* the venom can be squirted. Verhoeff mentions this also for certain *Pachyiulus*, *Lysiopetalum* and *Appelbeckia*. Of particular interest are observations recorded by Loomis (1936). He found that *Rhinocrichus lethifer* Loomis in Haiti habitually squirted fluid a distance of several inches when disturbed and one specimen projected its venom about 18 inches. On a subsequent occasion in Haiti he records (1941) *Rhinocrichus latespiger* Loomis behaving similarly. A number were released on a cement floor and irritated with a long switch. Several were able to squirt their fluid a distance up to 24 inches, but the maximum achievement was a double salvo from an animal which sent its discharge 28 inches on one side and 33 inches on the other. In all these cases fluid left the body so suddenly and in such fine jets that it could scarcely be seen before it fell on the cement floor in tiny droplets distributed somewhat fan-wise from the body. Squirting of fluid by large millipedes in New Guinea was observed by McNamara (Musgrave). The present writer witnessed similar behaviour by a large *Juliform* in Tanganyika Territory, but did not record this observation at the time. Three species were frequently seen near Amani. Fluid was extruded when the animals had coiled up after being disturbed. From the two smaller (about 6 inches in length) fluid was only exuded in droplets along the sides, but in the case of the largest

species (10-12 inches in length) it was squirted. Frequently several fine jets were projected simultaneously. The fluid (inclined upwards at about 30 degrees) in the vicinity around the creature as it lay quiescent when molested but as soon as its supplies were seemingly getting exhausted it would uncoil and make every effort to escape.

Injurious Effects of the Secretion—Since millipedes have no means of inoculating their secretion poisoning effects produced in animals by experimental sub-inoculation will not be considered here. Verhoeff recorded getting a small

to the animals which produced it when they were confined in bottles and acted similarly on other small creatures (PHISALIX 1922). Apart from these instances records of injurious effects seem to be confined to the Juliformia—particularly to the venom-projecting species.

(PHISALIX *loc cit* TURK) The fluid from *Rhinocricus lethifer* caused smarting when it came in contact with the moist skin of the back of the hands and lower forearm (LOOMIS *loc cit*). BURTT tested fluid on himself and found that mere contact with the tough skin of the fingers produced no injurious symptoms but when it was rubbed on the skin of the leg smarting resulted and the skin subsequently became hard and scaly. Fumes from this secretion caused marked watering of the eyes. GRAVELY (1915) mentions that certain of the larger Indian species exude an evil smelling coloured fluid when disturbed. In one species he records a particularly virulent fluid which not only smells but stains and burns one's hands.

Known injuries of a more serious nature from secretion of Juliformia fall into two categories—(a) caustic action on the skin (b) injury to sight.

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that the affected parts were bathed forthwith in ice water to remove the secretion. Swelling of the eye lid and cheek progressed rapidly and soon the eye was closed. It remained in this condition for several hours after which

greatest. The blisters persisted for nearly a week after which the discoloured skin peeled off without leaving any scars and no further ill effects were experienced.

In 1937 near Amam the secretion of a squid detailed above chiefly

was prolonged and there was not the consciousness of immediate pain. A millipede* was picked up and placed in the hip pocket where it was left for about an hour. The creature was felt moving about and slight soreness developed in that region. Soon afterwards, on inspection, it was found that the skin over the corresponding area of about nine square inches was black and inflammation was extending right down the thigh. The pocket had become soaked with exudate and the soaked cloth had been pressed against the skin: no blisters were produced. Four days later all the blackened skin sloughed off, leaving a raw wound. The scar of the injury was still clearly defined more than a year later.

(b) *Injury to sight.*

LOOMIS (1936) remarked that local natives in Haiti were thoroughly familiar with the ability of *Rhinocricus lethifer* to blind small animals, especially chickens, but he had no evidence that the fluid had any direct lethal action. Blinded chickens were usually killed forthwith by their owners or, if left, died of starvation. In his own case, despite the intense pain, no injury to the eye itself seems to have occurred. Probably instinctive blinking of the eyelid had

...ig the eye to any extent.

C. T. McNamara while in Papua as having written that a very large species of millipede, common in the bush there, was held in great dread by the natives. They stated it was able to squirt out a jet-black viscid fluid which would cause blindness if it entered the eye. He personally had not met with a single instance to bear out this rumour; he had often molested the millipedes on purpose and had them shoot out jets of iodine-like fluid into his open palm. However, despite the lack of corroboration of injury to man, McNamara stated he actually did witness his own puppy get fluid squirted into its eye by one of these creatures and the eye concerned went completely blind.

From the above account it will have been seen that the species venom appears to be merely oozes from the body, as it does in the majority of European forms. No satisfactory explanation of how the venom comes to be thus projected appears to exist. Verhoeff merely suggests that squirting is an index of a difference in the nervous impulse (influenced by the hot climate) acting on the basic type of mechanism (mentioned above) worked out for some of the European species. The problem seems to want further investigation. Practically nothing is known about the secretory apparatus and exudates in the big exotic species. That some of the latter are very poisonous is indicated by the fact that they yield poison for arrows (Verhoeff). The properties and composition of the venom and the method of its expulsion would undoubtedly repay further study.

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*The actual specimen, 12 inches in length, is preserved in the Zoological Museum, the University of Reading, England. Its identification is uncertain but it was regarded as a species of *Spirobolus*

series did so. Tests of sulphasuxidine were disappointing. GUPTA *et al* (p 130) treated 263 cholera patients with sulphaguanidine, and 262 alternate case controls without that drug. Salines were used as necessary.

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The authors found that pyrogenic solutions can be rendered non pyrogenic by heating with potassium permanganate or hydrogen peroxide. The change is not due to alteration of pH.

GREIG (p 927) has contributed an interesting historical account of the use of intravenous saline injections in cholera by Dr Latta of Leith in the early 19th Century.

Vaccination

In the Report of the Indian Research Fund Association for 1943 (p 131), statistical evidence is produced that the injection of cholera vaccine is undoubtedly very effective in protecting against infection. Protection is maximal on and after the tenth day after inoculation and it is calculated that un inoculated persons are ten times as liable to infection as inoculated persons. The statistical basis of this investigation appears to be quite valid. The

persons inoculated some time before the second outbreak in villages affected twice and it is calculated that immunity may persist in an inoculated population for 10 or even 12 months.

ELSEWILL and YOUNG (p 332) have found that the best cholera vaccine is produced by using formal killed or heat killed Inaba strain combined with formalized filtrate of Inaba or El Tor strains (the El Tor strain being finally selected). This vaccine and others against bacillary dysentery retained immunizing power much longer if desiccated in a vacuum. Formalized organisms combined with formalized filtrate, give rise to the strongest and most lasting antibody production.

Charles Wilcocks

MALARIA.

PUTNAM, P. & HACKETT, L. W. An Appraisal of the Malaria Endemic in Protected and Comparison Areas of Sardinia in the Years 1925-1934. *J. National Malaria Soc.* Tallahassee, Fla. 1946, Mar., v. 5, No. 1, 13-37, 9 figs.

General antilarval measures were begun in Portotorres, a town with 6,000 inhabitants on the north-west coast of Sardinia, in 1925. The object was to determine what a limited programme could accomplish in a highly malarious community. The parasite rate then was 34 per cent. and the spleen rate 47 per cent. among children from 1 to 12 years of age. The carriers were *A. labranchiae labranchiae* and *A. sacharovi*, which was rare. *A. algeriensis* was also found. Three other Sardinian towns were observed as comparison areas. The objects of the present paper are to compare the trend of the malaria, endemic in these towns, during a ten-year period, and to demonstrate analytical methods best suited to bring out time trends, area differences and interrelationships of the indices employed. These indices were *Anopheles* density, malaria incidence, infant infection rates, parasite and spleen rates, average spleen and average enlarged spleen rates. The various statistical methods employed are described.

Anopheles density and malaria prevalence in Portotorres declined sharply from 1925 to 1929. In the other towns there was a decline in endemicity from 1929 to 1934, but the spleen and parasite rates and average spleens remained significantly lower in Portotorres. In Portotorres there was an interval of seven weeks between the summer rise of anopheline density and the consequent rise in malaria incidence.

Norman White.

HERNBERG, C. A. Studier över malaria i Finland åren 1943-1945. [Malaria in Finland in 1943-1945.] *Nordisk Med* 1946, Aug. 30, v. 31, No. 35, 1961-2. Discussion 1962 [VON BONSORFF, B. HAGELSTAM, L.]

The incubation period of malaria is accepted to be 10 to 14 days, but in the opinion of some it may be prolonged up to one year, and observations made by the author lend support to this view. In 1944 there was an epidemic of malaria amongst troops in Karelia, amounting to 2,000 cases. Over the same period there were practically no cases of malaria in the main part of Finland. In 1945 a thousand cases of malaria occurred in the country, and the epidemic showed the following features:—(1) most patients were of military age. (2) cases were scattered over the whole country. (3) cases occurred in the far north, where the temperature was too low for transmission by mosquitoes to be possible: (4) in half the cases infection must have occurred before the middle of April if the patients had been infected in the same year. (5) infection from hibernated mosquitoes was impossible as most localities had been free of malaria in the previous year.

The author concludes that infection must have occurred in the previous year, with an incubation period of one year in one-third of the cases. A follow-up revealed that nearly all had served in Karelia in 1944.

Infectivity is perhaps low towards the end of the summer, so that the parasites remain quiescent in the reticulo-endothelial system. A long incubation period might, on these grounds, be expected to be more common in the North, with its short summers, than in Central Europe, and to be entirely absent in the tropics.

D. J. Bauer.

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Malaria Inst of India 1945 Dec v 6 No 2 101-8 3 maps
— & NASSIRUDDIN M Malaria in the Irwin Canal Area, Mysore State
Part II Ibid 109-28 3 charts

The Irwin Canal came into operation in January 1932. A dam across the Cauvery River 12 miles north of Mysore formed a reservoir from which the canal takes water some 2½ miles north-easterly and then traverses a tunnel 2 miles long through the Kanhatta Hulikere range of hills to irrigate five valleys which together cover some 400 square miles. The gently undulating irrigated land is from 2 100 to 2 300 feet above sea level and drains into the Shimsha River in which water flowed for only a few months of the year during and after the monsoon. There are 50 villages in the irrigated area with a total population of about 200 000. The area was generally healthy with only a few malaria foci of low endemicity.

Irrigation is perennial and a triennial rotation of crops was planned: sugar cane, paddy and dry crops. Within 3 years the land became saturated with water, the subsoil water rose from 20-40 feet below ground to practically ground level. The overcharged tanks produced a vigorous growth of surface vegetation. The dry lands came under wet cultivation and there was but little pasturage for sheep or cattle. An enormous snail population developed in the tanks and resulting fluke disease of sheep and cattle caused in alarming mortality. An epidemic of malaria was followed by hyperendemic conditions. By 1933 the spleen rates of 25 villages which had been 0-10 per cent before irrigation had risen to 50-90 per cent.

A. ci heifacies is the only anopheline that has been found infected. Malaria transmission is most active from March to June and from October to December. *A. flu viatilis* is suspected of being a carrier also. An attempt to control malaria in ten villages by the systematic use of paris green is described and the results of five years work are recorded. Control was effective during the first four years but with the subsequent development of paddy cultivation within the two furlong zones surrounding the villages the malaria prevalence in 1940 had once more become very severe.

Norman White

- WOLFF A C Malaria in Surinam
Apr v 25 No 4 335-8 1 map

Bof Oficina Sanitaria Pa iamericana 1946

- BELLERIVE A & DUMREVILLE C
[The Malaria Problem in Haiti]
1946 Mar v 10 No 1 2-3

El problema de la malaria en Haiti
Tijeceta os sobre Malaria Venezuela

This is an English translation of the author's summary —
Malaria presents an important sanitary problem in the Republic of Haiti. Some 10 000 to 73 000 cases are reported annually with 100 to 700 deaths. The disease has been present in the country since time immemorial and has had a profoundly adverse effect on its economic and social life.
A Commission from the International Health Division of the Rockefeller Foundation examined 31 285 children and found spleen rates of 18.4 per cent and parasite rates of 46.3 per cent. In 78 per cent of the children with enlarged spleens and in 32 per cent of those with normal spleens malaria parasites were found in the peripheral blood.
Following the first efforts in sanitary engineering in Petit Goave by the Section of Malaria Control the infection rate fell in two years from 86.1 per cent

[January, 1947]

radioactivity of the concentrate is due to the fact that the parasite invades by preference the young blood cells on which the radioactivity of the blood depends

BLACK R H The Behaviour of New Guinea Strains of *Plasmodium falciparum* and *Plasmodium vivax* when cultivated in vitro *Med J Australia* 1946 July 27 v 2 No 4 109 11 [12 refs]

This is a fuller account of the work described in an earlier note [this Bulletin 1946 v 43 816]. It is noted that in the method of culture in which infected red blood corpuscles are added to serum in the flat bottomed tube this serum is an efficient medium whether taken from the patient suffering from malaria or from another individual not suffering from malaria. In the case of *P. falciparum* the growth from ring to mature schizont occupied slightly more than 48 hours. At the end of about 12 hours parasites with irregular outline and some scattered pigment were seen. With further growth the parasites became oval or rounded in outline with compact pigment and undivided chromatin. This stage is referred to as the pre-schizont. Next there is an increase in the chromatin which becomes scattered through the cytoplasm as a filigree with here and there concentrations giving a beaded effect. This early schizont was rapidly changed to one in which the chromatin became condensed into discrete chromatin segments. Finally the cytoplasm condensed around the nuclei to form merozoites the pigment forming a single oval compact mass. When the schizont ruptured the liberated merozoites invaded other red cells as many as eight being seen in a single one. These merozoites did not develop as readily as the first generation. In the case of *P. vivax* similar results were obtained the growth period occupying 48 hours. There were two differences. Firstly there was not the distributed chromatin stage as seen in *P. falciparum*. The single chromatin mass divided into two and these again divided and so on till the requisite number of nuclei were present for merozoite formation. After rupture of the mature schizonts the liberated merozoites did not enter other red blood corpuscles. It is suggested that as the merozoites of *P. vivax* prefer young cells this may account for their failure to enter the older red cells in the culture tube. Schiffer's and Maurer's dots were seen but gametocytes were not found. The adhesiveness of cells infected with *P. falciparum* is shown by their tendency to clump and to adhere to any leucocytes which may be present. The failure of the second generation to grow properly raises the question of the nutritional requirements of parasites in culture an understanding of which might lead to an explanation of the mode of action of anti malarial drugs.

C M Henyon

SHUTE P G The Maintenance of a Strain of *Plasmodium vivax* through Man and Mosquito over a Period of 21 Years *Monthly Bull Ministry of Health & Emergency Pub Health Lab Service* (directed by Med Res Council) 1946 May v 5 110-12 1 chart

An account is given of the strains of malaria parasites which have been maintained at the Malaria Laboratory at the Horton Mental Hospital during the past 22 years. A particular strain of *Plasmodium vivax* known as the Madagascar strain as it was taken from a member of the crew of a ship which had just completed a voyage from Madagascar to London has been maintained uninterrupted through many hundreds of passages in man and mosquito over a period of 21 years. At one time it was thought that this was a particularly virulent strain but it seems that the severity of the attacks produced is due to the careful selection of heavy gametocyte carriers for infecting mosquitoes.

many of which develop over 1,000 oöcysts. At the start the mosquitoes (*Anopheles maculipennis*) were taken wild from animal houses, but after 1933 a strain was raised and maintained in the laboratory from eggs laid by a single female. Among other strains of malaria parasite, a Rumanian strain of *P. falciparum* was maintained over a period of 13 years and one of *P. ovale* for 3 years.

C. M. Wenyon.

ETHERINGTON, D. & SELICK, G. Notes on the Bionomics of *Anopheles sacharovi* in Persia and Iraq. *Bull. Entom. Res.* 1946, Sept., v. 37, Pt. 2, 191-5, 2 figs.

This paper records some disconnected observations on *Anopheles sacharovi* made in Persia and Iraq during the last months of 1943 and the early part of 1944. This anopheline was usually obtained at places between 500 and 5,000 feet above sea level, but at Shatt-el-Arab it was found at sea level.

At the onset of hibernation *A. sacharovi* seemed to enter houses and stables more frequently; in northern Iraq during August and September it was caught in small numbers in sprayed houses and stables, but in greater numbers in October; the first specimen with fat-body was taken on the 1st October. Between then and 26th October only twenty females out of 343 possessed ovaries beyond stage II. In three visits during the winter to uncontrolled villages on the Persia-Iraq border, the authors obtained adult *A. sacharovi* in increasing numbers, the sporozoite rate was 0.41 per cent. (2 in 486 mosquitoes dissected).

In north-east Iraq, where winter temperatures are low, eggs with well developed floats were obtained in February 1944; but the floats on eggs collected at the same time from the warmer Shatt-el-Arab region were less developed.

In Iraq and Persia, autumn spleen rates of between 60 and 100 per cent. were usually obtained in villages where *A. sacharovi* was found; but in one area south-west of Teheran spleen rates in July and August were only 20 to 28 per cent., though *A. superpictus* also occurred there; much higher rates were recorded at the same altitude 100 miles further north, though only *A. superpictus* and *A. maculipennis* var. *typicus* were present. H. S. Leeson.

RAJINDAR PAL. On the Bionomics of *Anopheles culicifacies* Giles. Part III. The Behaviour of Adults. Part IV. Hypothesis of the Races of *A. culicifacies*. *J. Malaria Inst. of India.* 1945, Dec., v. 6, No. 2, 217-38. 9 charts; 239-41, 1 fig. [34 refs.]

Routine collections of *A. culicifacies* were made from specially selected catching stations—human dwellings, animal houses and combined dwellings—in Delhi from 1939 to 1943 by the Malaria Institute of India. Routine larval collections

the year.
of atmosphere
of the year,
monsoon in
are most numerous in September, when humidity is very high. In October and November prevalence and temperature show a downward trend but there is no reduction in breeding places. December to February inclusive are the coldest months, and the prevalence of *A. culicifacies*, larvae and adults, is low. The density varies markedly from year to year. The density per man-hour was 3.4 during normal years and 25 during an epidemic of malaria. A density

[January 1947]

below 5.0 per man hour is claimed to be incompatible with malaria transmission. Temperatures from 25 to 30°C with relative humidity from 60 to 80 per cent are the most favourable conditions for the longevity and activity of this species. There was no evidence of hibernation or aestivation of adults. The most favoured daytime resting places are in dark houses and cattle sheds. *A. culicifacies* is not an habitual feeder on man. During a malaria epidemic precipitin tests showed that 10.7 per cent had fed on man. The maxillary index was 13.0 in both epidemic and non-epidemic years. Biting activity decreases after midnight. After oviposition in summer *A. culicifacies* may return for a second blood feed the same night. This species does not ordinarily fly more than half a mile from its breeding place. Intensive morphological studies of *A. culicifacies* from parts of India where it does and where it does not transmit malaria failed to reveal any difference indicative of the existence of different races.

GARTFELL T E & ORGAIN H. Notes on the Prolific Production and Dispersion of *Anopheles quadrimaculatus* from Impounded Water Breeding Places. J. National Malaria Soc. Tallahassee Fla. 1946 Mar. 5. No 1 79-84 1 map. Norman White

The partial filling of the Kentucky Reservoir on the lower Tennessee River during the late summer of 1944 resulted in prolific breeding of *A. quadrimaculatus*. An investigation was made to determine the distance to which the dispersion of this mosquito was occurring. The Cane Creek area was selected. Cane Creek is a clear rapidly flowing stream with gravel bed very few pools and very little vegetation. Prior to impoundage of the Tennessee anophelines were hard to find in this valley. In October 1944 counts of 100 and 150 female *A. quadrimaculatus* were recorded in catching stations 2.8 and 2.3 miles from the reservoir. A maximum count of 1500 was made at a distance of approximately one mile from the breeding area. The long flights may have been prehibernation flights. It is possible that the distant dispersions were the result of one or more secondary flights after an initial blood meal.

AMERICAN J. Hyg. MONOGRAPHIC SERIES No 18 1946 Feb. pp. vi+50. 20 pls. [32 refs.] Studies on Brazilian Anophelines from the Northeast and Amazon Regions. I. An Illustrated Key by Adult Female Characteristics for the Identification of Thirty-Five Species of Anophelini, with Notes on the Malaria Vectors (Diptera: Culicidae). DEANE L. W. & CASEY O. R. & DEANE L. W. II. An Illustrated Key by Male Genitalia Characteristics for the Identification of Thirty-Four Species of Anophelini, with a Note on Dissection Technique. (CASEY O. R. DEANE L. W. & DEANE L. W. P. I). III. An Illustrated Key by Larval Characteristics for the Identification of Thirty-Two Species of Anophelini with Descriptions of Two Larvae (DEANE L. W. & CASEY O. R. & DEANE L. W.) Baltimore Md. The Johns Hopkins Press. Norman White

These keys to females with genitalia and larvae of anophelines are based on studies made in the north east and Amazon regions of Brazil since 1939. The authors illustrated key to the eggs of thirty species of Brazilian anophelines this Bulletin 1944 v. 41 644 is not included in this volume. The key to female anophelines presented in the first paper is illustrated by some sixty three drawings of distinguishing morphological characters and is preceded by some remarks on the important malaria vectors *A. darlingi*, *A. aquasalis* on two vectors of secondary importance *A. albivittatus*, *A. personi* and on the introduced vector *A. gambie*.

Before the eradication of *A. gambiae* was accomplished, experiments showed that, owing to its domestic habits, preference for human blood and susceptibility to *Plasmodium*, this species was the most dangerous vector. The most efficient indigenous vector is *A. darlingi*, which even when present in small numbers only is able to maintain malaria transmission; *A. aquasalis*, on the other hand, becomes important only when it is very numerous.

Prior to 1926 many infected specimens identified as *A. albitarsis* were in reality *A. darlingi*; these species are now easily distinguished and *A. albitarsis* is regarded as of secondary importance. Studies on the morphology and bionomics of *A. albitarsis* indicate that there may be an "*albitarsis* complex" composed of a number of species. *A. pessoai* may become a malaria vector in certain circumstances but is only of local importance.

One table sets out the distinguishing characters of eleven species of the "*tarsimaculatus* complex", and another lists the geographical distribution of the thirty-five species.

In the second paper there is a description of the general morphology of the genitalia of male anophelines, illustrated by schematic drawings, and an account is given of the technique employed in dissection and microscopical examination of the parts. The key is illustrated by photomicrographs of each species.

The third paper contains descriptions of the larvae of *Anopheles* (*Nyssorhynchus*) *galvãoi* and *Anopheles* (*Anopheles*) *shannoni*. Besides the key to the larvae which is illustrated by some 90 line drawings, a table is given repeating the geographical distribution, but including some notes on the more usual breeding places.

H. S. Leeson.

PENFOUND, W. T., HALL, T. F. & HESS, A. D. The Spring Phenology of Plants In and around the Reservoirs in North Alabama with particular reference to Malaria Control. Reprinted from *Ecology*. 1945, Oct., v. 26, No. 4, 332-52, 4 figs. [14 refs.]

Since it has been shown that the extent to which plant organs intersect the water line influences the breeding of anopheline mosquitoes; that the population density of anopheline larvae is correlated with the intersection value (length of intersection line per unit area), and as *Anopheles quadrimaculatus* breeds almost entirely in aquatic, and semi-aquatic, vegetation and flottage, it follows that one method of attack against this mosquito is to remove or control such vegetation.

In 1937 the authors began a study of this subject in reservoirs in the Alabama section of the Tennessee Valley. In this paper they record observations made since that time but chiefly during the years 1941 to 1944 inclusive. They are concerned particularly with the late winter and spring seasons because of the relation of plant phenology at that time with the breeding season of anophelines. They have summarized their observations on fifty-three species of herbaceous plants and forty-nine woody plants, in two tables indicating times of sprouting, full foliage, flowering and fruiting between February and June.

The phenology of these plants is discussed in some detail, taking them singly or in groups according to habit. Herbaceous plants for example are dealt with in three groups, terrestrial, wetland and aquatic and the aquatic plants are further sub-divided into emergent, floating and submerged. Methods of water management suitable for the control of each type of plant involves either maintaining a constant water level for some or fluctuating water levels for others. In the case of the latter, progression, cyclical fluctuation or recession have been studied and may necessitate complete submergence of the plant at a particular period of its development, or dewatering, or cutting with subsequent flooding,

or cutting combined with dewatering. One plant the alligator weed (*Alternanthera philoxeroides*) has proved particularly obnoxious because of its habit of producing a floating mat which prevents larval control by water level fluctuation. Best results were obtained by spraying it with larvicidal oil.

So far as the phenology of most plants is related to the breeding of anopheline mosquitoes the important aspect is the production of leaves near or on the water surface and this can be delayed or prevented by the proper manipulation of water levels. A minimum of recession is found to be the most desirable as it restricts the band of vegetation available for the breeding of *Anopheles quadrimaculatus*.

Readily recognizable indications of the commencement of the anopheline breeding season are the appearance of the first leaves of the lotus (*Nelumbo pentapetalà*) the flowering of the cow lily (*Nuphar adriana*) and the flowering of the black willow (*Salix nigra*) which events usually occur two weeks before the initial appearance of larvae of *Anopheles quadrimaculatus*. H S Leeson

BROOKE M M & PROSKE H O. Precipitin Test for determining Natural Insect Predators of Immature Mosquitoes. *J National Malaria Soc* Tallahassee Fla. 1946 Mar v 5 No 1 45-56

Many predatory insects suck the fleshy internal structures of mosquito larvae and discard the chitinous exoskeleton. It is not possible by microscopic examination of their stomach contents to determine their natural food selections. Experiments were therefore made to determine whether a precipitin test might be able to demonstrate the presence of anopheline larvae ingested by aquatic insect predators.

An antiserum was produced by intraperitoneal inoculation of a rabbit with macerated pupae of *A. quadrimaculatus*. This serum reacted with larval pupal and adult stages of both anophelines and culicids.

precipitin test might be of value in the study of natural enemies of the vectors malaria and other diseases

Norman White

UM D GOLDBLUM N & KLIGLER I J. Further Observations on the Enhanced Fragility of Red Cells in Malaria Patients. *Acta Med Orientalia (Palestine & Near East Med J)* 1946 June v 5 No 6 177-84 [11 refs]

they state that quinine administered *per os* for a week to normal subjects does not influence either the rate of lysis of red cells or the reticulocyte count. The enhanced sensitivity of cells from malarial patients persists for 8 weeks after the attack.

The stimulating effects of quinine and atabrin were not due to pH changes, although alkali had an inhibiting effect on the lysis. Normal and malarial sera exerted equal inhibitory effects on the haemolytic system. The authors consider that in malaria it is probably the red cell itself which is chiefly affected.

[The synergistic effect of atabrin seen in these experiments is interesting in the light of similar effects observed in other lytic systems by ZYLMANN (this *Bulletin*, 1946, v. 43, 405)].
B. G. Macgrath.

NORHREN, T. H. Malaria in Panama. *U.S. Nav. Med. Bull.* 1946, June, v. 46, No. 6, 877-84, 1 chart. [10 refs.]

This paper recounts the experience of a Naval Medical Officer during 20 months in Panama, and is based on the study of 147 patients with malaria treated at a Naval Hospital. Only 42 of these patients were admitted to hospital with a diagnosis of malaria; 64 were sent with "diagnosis undetermined, possibly malaria"; the remainder were sent to hospital with diagnoses not suggesting malaria. During the same period 49 other patients were admitted to hospital with diagnoses suggesting malaria, but they were found to be free from malaria infection.

The most prominent and characteristic symptoms of the malaria patients were fever, retrobulbar headache, low back pain, perspiration of unusual odour, sudden malaise and anorexia. A combination of any four of these symptoms is highly indicative of malaria.

Cases of malaria were most frequent at the beginning and at the end of the wet season, though infection may be acquired in any month. The rainy season in Panama begins early in May and continues to December. Many patients gave a history of exposure to infection at known endemic places.

Tropical fevers of uncertain origin may simulate malaria. The classical symptoms of malaria are not infrequently absent in proved malaria cases in Panama.
Norman White.

KITCHEN, S. F. & PUTNAM, P. Observations on the Character of the Paroxysm in Vivax Malaria. *J. National Malaria Soc.* Tallahassee, Fla. 1946, Mar., v. 5, No. 1, 57-78, 5 figs.

This is an analysis of the febrile reactions of 70 white patients with neurosyphilis who were infected by mosquito bite with the McCoy strain of *P. vivax*.

The onset of *P. vivax* attacks may be marked by a few days of remittent fever, or of quotidian or tertian fever, or by a combination of both. Most attacks continue with quotidian periodicity. Intermittent fever from the

... were ushered in by rigors, as compared with 71 per cent. in longer attacks. The mean maximum temperature of 654 paroxysms with rigors was 1.7°F. higher than that of 346 rigorless paroxysms. An average of 5 days' clinical activity preceded the first rigor. The mean parasite density at the time of the first rigor was 4,012 per cmm. as compared with 274 on the day of first paroxysm. The mean duration of 654 rigors was 52 minutes. The patient's temperature was below 100°F. at the onset of 71.6 per cent. of the rigors. A mean increase in temperature of 4.2°F. was observed during the rigor. The highest mean maximum temperature in the course of 51 attacks was reached on the 7th day following onset; the mean maximum parasite density on the 9th day. Eighty-one per cent. of the 654 rigors occurred during the afternoon hours.

QUEY AU VILLER, A L'élimination de la quinine injectée au lapin est ralentie par un "véhicule-retard", le subtosan [Diminished Quinine Elimination in Rabbits, produced by a "Retarding Substance", Subtosan.] *Rev Paludisme et Med Trop* 1946, Oct 15 v 4 No 29, 225-8, 1 fig

HERTZBERG, R Quinine Amaurosis: a Report of a Case. *Med J Australia* 1946, July 20, v 2, No 3, 92-3

The author believes this to be the first case of quinine amaurosis among Australian soldiers in the late war

The patient's history, chronologically, was as follows —

Jan 28th, 1946	10 grains of quinine sulphate (one dose of <i>Mist Quininae</i>) for benign tertian malaria
„ 29th „	30 grains of quinine sulphate
„ 29th „ (evening)	Vision blurred
„ 30th „	On waking, was blind 10 grains of quinine sulphate before he was medically examined then quinine stopped and "Atebrin" given
„ 31st „	Vision commenced to return, after 24 hours' blindness
Feb 3rd „	Ophthalmological examination visual acuity, 6/9 in both eyes, pupils dilated and immobile, oedema at both maculae, but no other changes in the fundi, the fields were full (10/330 white)
„ 5th „	Additional changes in both fundi, disks pale, especially the right, arteries attenuated, and tended to become buried, no changes seen in the fields (10/330 white, red, blue)
„ 14th „	Patient stated that up to two days earlier he had difficulty in finding his way in the dark Examination showed no new changes
„ 21st „	Pupils normal in size and reactions visual acuity 6/9 in the right eye and 6/6 in the left, oedema at maculae disappeared, vessels still attenuated and right disk pale
Mar 4th „	(Five weeks after onset) visual acuity 6/6 in both eyes, no new changes in the fundi the fields were full (2/1,000 white)

The author quotes cases in the literature showing that visual symptoms may not only after doses of quinine similar to those in this case, but also following small dosage e.g 1.0 and 1.25 grains Blindness following massive doses has also been reported and the author quotes the typical results described by MCGREGOR and LOEWENSTEIN [this *Bulletin*, 1945, v 42, 91]

of the central artery of the retina" The element of vaso-constriction is probably secondary

In treatment the important measure is rapid elimination of the quinine but in the present case, the author did not see the patient until more than three days after quinine had been stopped Expectant treatment was therefore carried out, and vitamin B administered Recovery, as indicated above, was complete

H J O'D Burke Gaffney.

ROTEBURG, S. S. [Treatment of Malaria with Acridine by Administration of a Single Massive Dose on the First Day (0.3 gm. per os and 0.3 gm. intramuscularly).] *Med. Parasit. & Parasitic Dis.* Moscow. 1945, v. 14, No. 4, 62-70, 1 fig. [In Russian.]

The author had previously made observations on the excretion of acridine [=mepacrine] in urine after administration by mouth and by intramuscular injection, and has demonstrated that the therapeutic effect is higher when acridine is introduced in a single massive dose of 0.6 gm. (0.3 gm. by mouth and 0.3 gm. intramuscularly, administered simultaneously). Under these conditions the concentration of acridine reaches a sufficiently high level in urine during the first hours and is maintained in the course of the first day of treatment, whereas after oral administration (even in a dose of 0.6 gm.) a sufficient concentration is attained only during the second half of the first day of treatment. On the other hand, if acridine is introduced only intramuscularly, an adequate concentration is reached rapidly but is retained only for 8-12 hours after the injection.

In the present paper, the author records the results of experimental treatment of 398 patients suffering from malignant and benign tertian malaria. Of these, 269 were given a single massive dose of 0.6 gm. on the first day, as described above, followed by doses of 0.3 gm. on the second and third days. The remaining 129, who served as controls, were treated by one of the following methods:—(a) 0.6 gm. acridine given by mouth, in two doses, on the first day, and 0.3 gm. daily on the second, third and fourth days; (b) daily dose of 0.3 gm. intramuscularly, and (c) daily dose of 0.3 gm. intramuscularly. All three cycles of treatment were the same in all cases, with intervals of ten days between the cycles. It is stated that the method of massive administration of acridine on the first day (simultaneously by mouth and intramuscularly) was superior to all the others, as regards the time required to suppress the symptoms and to clear the peripheral blood of the parasites. The second place, from the point of view of therapeutic effect, was occupied by the method in which the massive treatment was carried out in two doses, given during the first day. In all these courses of treatment, no relapses occurred, provided the intervals between the cycles did not exceed 10-12 days.

The massive method of treatment has the advantage over the others in that the number of days (3) and the amount of drug used (1.2 gm.) in the course of the first cycle are reduced without affecting the frequency of relapses in those cases, in which the intervals between the cycles were unduly prolonged. Moreover, this treatment was not accompanied by any side-effects.

C. A. Hoare.

ANN. TROP. MED. & PARASIT. 1946, July, v. 40, No. 2, 215-18. Prolonged Oral Administration of Mepacrine. III. The Clinical Effects in Women. [Army Malaria Research Unit, Oxford (MAEGRAITH, B. G., et al.).]

This paper is a continuation of the reports on work carried out during the war to study the effect of prolonged administration of mepacrine to volunteers. One hundred and nine women students were divided into five groups, those who received 0.6 gm. mepacrine weekly, or 0.4 gm. weekly (3 groups on different placebo. After three months, daily (0.7 gm. weekly). When concentrations in these volunteers were just before the next dose) were 25 to 35 μ gm. per litre. Twelve volunteers had mild gastrointestinal symptoms which disappeared spontaneously, although the mepacrine

was continued. Three of the volunteers developed psychotic disturbances, two of these were almost certainly not due to mepacrine and the other one or may not have been due to it. No other symptoms of consequence occurred. The mepacrine concentration in the blood was not altered. The mepacrine concentration in the urine was not altered. The mepacrine concentration in the sweat was not altered. The mepacrine concentration in the tears was not altered. The mepacrine concentration in the saliva was not altered. The mepacrine concentration in the feces was not altered. The mepacrine concentration in the urine was not altered. The mepacrine concentration in the sweat was not altered. The mepacrine concentration in the tears was not altered. The mepacrine concentration in the saliva was not altered. The mepacrine concentration in the feces was not altered.

F Hawking

ANN TROP MED & PARASIT 1946 July v 40 No 2 181-9 4 figs 1
Distribution of Mepacrine in Blood [Army Malaria Research Unit Oxford
(MAGRAITH B G *et al*)]

This is a confirmation of the work of SHANNON *et al* [this Bulletin 1945 v 343]. The mepacrine concentration in the various constituents of the blood was measured by MASEN's method [this Bulletin 1945 v 428].

Examinations were made on 8 subjects who had received mepacrine in various regimes and who had different white cell counts. The plasma contained 3-16 per cent (usually 8-14 per cent) of the total amount of mepacrine present. The red cell layer contained 8-35 per cent (usually 11-13 per cent) and the white cell layer contained 49-89 per cent (usually 72-82 per cent). Typical concentrations of mepacrine in μgm per litre were —

whole blood	208
plasma	60
red cell layer	40
white cell layer	9 600

It is not known whether the mepacrine in the white cell layer is in the white cells themselves or in the platelets. The concentration in the plasma is a better indication of the concentration in the red cells than is the concentration in the whole blood. A patient with leukaemia (white cell count 200 000 per cm^3) had a mepacrine concentration of 14 days. The mepacrine concentration in the plasma was 60 μgm per litre but the concentration in the white cell layer was 9 600 μgm per litre. This abnormally high concentration was due to the increased white cell count. A second leukaemic patient gave evidence of the same phenomenon.

F Hawking

ARCH INTERN MED 1946 July v 78 No 1 64-107 24 charts [Refs footnotes] Plasma Quinaerine Concentration as a Function of Dose and Environment. A Joint Report of the Armored Medical Research Laboratory Fort Knox Ky and the Commission on Tropical Diseases, Army Epidemiological Board, Preventive Medicine Service, Office of the Surgeon General, United States Army.

This is the record of a very thorough and important investigation carried out in America during the war in order to determine the plasma mepacrine level in large groups of young men on various prophylactic or therapeutic regimes. It is difficult adequately to consult with those interested in this work. The plasma mepacrine concentration of a single oral dose of 0.2 gm to men who had already received varying amounts of mepacrine are shown in Fig 1.

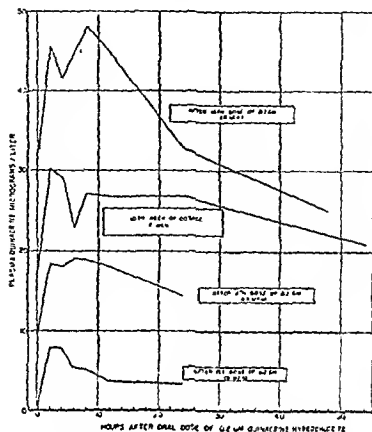


Fig. 1.—Postabsorption curves of plasma quinacrine concentration following 0.2 gm. dose

Most of the rise occurs in the first two hours, the peak is reached in 2 to 8 hours, and then there is a gradual decline in the concentration. (All plasma concentrations are expressed as mepacrine base, and all oral doses as mepacrine hydrochloride.)

The (geometric) mean plasma level of a group of men taking 0.6 gm. mepacrine weekly is shown in Fig. 2.

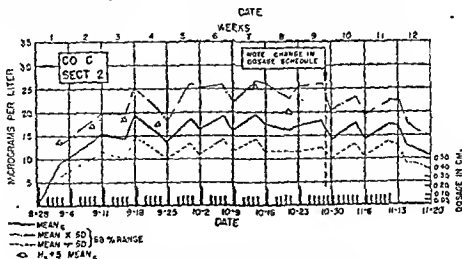


Fig. 2.—Mean plasma quinacrine levels of a group of men receiving 0.6 gm. per week.

The plasma level rises gradually during the first 3-6 weeks, after which it reaches a steady level or "plateau" which continues until the dosage is altered

or discontinued. When equilibrium is reached the mean plasma level is 30

the usual level Fig 3

for the first 6 days
then subsides to the

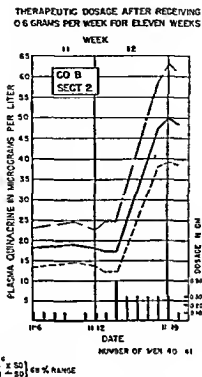


Fig 3 — Plasma quinacrine levels obtained with different priming doses (maintenance dosage 0.6 gm per week)

Men who had received 0.4 or 0.6 gm weekly for eleven weeks were then given a therapeutic course consisting of 0.5 gm on the first day followed by 0.3 gm on each of the next five days. The resultant mean plasma concentration is shown in Fig 4.

When the administration of mepacrine was discontinued the plasma level

prevent malaria

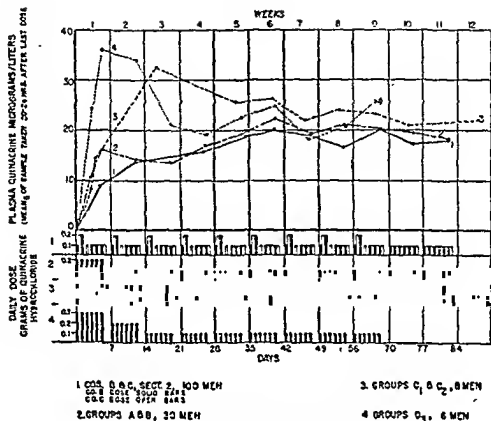


Fig. 4.—Mean plasma quinacrine levels of a group of men receiving therapeutic dosage for one week.

[Reproduced from *Archives of Internal Medicine*.]

cent. of the plasma concentration each day. When administration is discontinued, the level drops by 10 per cent. each day.

A hot humid environment (artificial "jungle") did not affect the absorption and storage of mepacrine as described above. No toxic effects were observed on any of the suppressive dose-régimes, but on the therapeutic doses one man had an epileptiform seizure at the fifth day; on the 6th day his plasma mepacrine level was 108 microgm. per litre. Administration was continued throughout the seven-day regimen and no further incident occurred. The skin of these subjects was stained yellow, but the intensity of the colour, or the fluorescence of the skin and nails, could not be correlated with the plasma mepacrine levels.

F. Hawking.

ANN. TROP. MED. & PARASIT. 1946, July, v. 40, No. 2, 173-80. Mepacrine in Animal Tissues. [Army Malaria Research Unit, Oxford (MAEGRAITH, B. G., et al.).]

This paper describes further results obtained during wartime investigation on the pharmacology of mepacrine, other parts of which have already been abstracted in this *Bulletin*.

A dog weighing 7.7 kgm. was given 2.5 gm. mepacrine by mouth (apparently during several days) and was killed 5 days after the last dose; the mepacrine content of the tissues (μ gm. per gm.) was:—liver 52, spleen 54, lung 60, kidney 23, heart 16, brain 4, muscle 11, pancreas 79, and suprarenal 29. Two other dogs showed a similar distribution. In three rats the concentration in the liver was relatively greater than this in comparison with the concentration in the other organs. When dogs which had received mepacrine by mouth were given

an intravenous injection of the compound the concentrations in the lung and kidney were greatly increased 10 minutes later the concentrations in heart and spleen were moderately increased while that in the liver showed little change by 24 hours the concentrations in all these tissues had returned to their previous levels. In a pregnant dog mepacrine passed through the placenta and the concentrations in the foetal organs were about $\frac{1}{3}$ to $\frac{1}{2}$ of those in the maternal organs. The bile in the gall bladder of these dogs contained considerable amounts of mepacrine (4 to 43 mgm per litre) but much of this mepacrine might have been reabsorbed as it passed down the intestine rather than have been excreted. When rats were given oral doses of mepacrine the concentrations in the different organs increased steadily during the first 6 hours but the relative distribution between the different organs remained unchanged.

Various studies were also made on volunteers. The concentration of mepacrine in the sweat was about the same as that in whole blood but the amount excreted by this route is negligible. The saliva contained concentrations approximately the same as in whole blood. The concentration in the semen (400–1 100 μ gm per litre) was 2–4 times as high as that of the blood. The concentration in the bile (measured in two patients with biliary fistulae) was 2–3 times as high as in the whole blood but it was much less than that in the urine. The total amount excreted in the bile (much of this may have been reabsorbed in the intestine) was about one fifth of that in the urine. Human hair contained up to 80 μ gm mepacrine per gm. dark hair contained more than light hair. A patient suffering from thrombocytopenic purpura was given 0.1 gm mepacrine for 14 days and the spleen was removed on the 15th day it contained 47 μ gm mepacrine per gm.

F. Hawking

DIMSON S. B. & McMARTIN R. B. Pamaquin Haemoglobinuria. *Quart. J. Med.* 1946 Jan. v. 15 No. 57 25–46 [30 refs.]

The observations recorded are based on 13 cases of haemoglobinuria that occurred among 10 000 Indian troops who had been given pamaquin during blanket treatment and 5 cases of haemoglobinuria that developed while 8 000 other Indian troops were undergoing the routine army treatment for malaria—quinine mepacrine and pamaquin successively. Blanket treatment was the course of treatment given to men with brown from a malarious area to one that is non malarious and consisted of mepacrine 0.1 gm thrice daily for 5 days rest for 2 days then pamaquin 0.01 gm thrice daily for 3 or 5 days. Three of the patients who had received blanket treatment died. Detailed information concerning possible aetiological factors and the results of blood examinations in the 18 cases of haemoglobinuria are given in tabular form. Clinical and post mortem findings were identical with those described in classical blackwater fever.

With respect to reaction to pamaquin patients may be divided into four groups: (a) those in whom there is no evidence of intravascular haemolysis; (b) those who show only a positive Schumm's test and in whom symptoms are vague or absent. (Schumm's test consists of the spectroscopic examination of plasma to which fresh concentrated ammonium sulphide has been added. In positive cases the α band ϵ^f — — — — — defined at 558 μ . The test has haemolysis as shown increase in urobilinogen & frustes of haemoglobinuria and the signs and symptoms are jaundice dark urine anorexia epigastric pain vomiting slight fever weakness giddiness

dyspnoea, palpitations and thirst; (d) those in whom frank haemoglobinuria occurs, with signs and symptoms identical with those of classical blackwater fever.

Over-susceptibility to pamaquin is believed to be the determining factor in producing the haemoglobinuria, and the previous administration of mepacrine an important contributory cause.

Norman White.

AGRESS, C. M. Atabrine as a Cause of Fatal Exfoliative Dermatitis and Hepatitis. *J. Amer. Med. Ass.* 1946, May 4, v. 131, No. 1, 14-21, 6 figs.

The author points out that almost no serious reactions are caused by atabrin (mepacrine), other than psychosis. He quotes 5 cases of severe hepatitis and exfoliative dermatitis, following the use of atabrin for malaria, in Chinese patients in the India-Burma theatre, but emphasizes that these represent a very small incidence, less than 1 in 3,000. He has only found one case in the literature of exfoliative dermatitis following atabrin, and no case of hepatitis.

In the present series, 3 of the 5 patients died. None of these cases occurred during a period when infectious hepatitis was present in other patients.

Detailed clinical descriptions of the 5 cases are given and it is pointed out that the specificity of the condition was not fully realized until the fifth case was encountered.

Clinically and *post-mortem* the cases were remarkably similar. Prominent features were the following:—

1. A rash appearing from the 2nd to the 10th day on as little as 0.1 gm. of atabrin in a sensitized patient, though larger doses were usually necessary. The rash was scarlatiniform, maculo-papular or a dry scaling, beginning on the face and involving the whole body, and being followed by desquamation. Exfoliation of the tongue and conjunctivitis also occurred.

2. Jaundice resulting from hepatitis sometimes appeared several days after the eruption. This was accompanied by high septic fever, leucocytosis as high as 40,000 per cmm. and eosinophilia up to 45 per cent.

3. Albuminuria, and bile, but not urobilinogen, in urine. The liver enlarges at first, but rapidly shrinks.

.....

..... as the desquamation progresses to a

6. Gradual deterioration, wasting, often eczematoid skin changes, progressive liver failure, and death in coma in the 3rd to the 5th week.

7. The following *post-mortem* changes were found: exfoliative dermatitis evidence of severe hepatitis, or necrosis producing a small wrinkled liver with mottled degenerative areas; acute cloudy swelling of the kidneys with bile staining; moderate adenopathy; splenomegaly typical of malarial infection.

The author presents the following major points in favour of atabrin as the aetiological agent:—

1. It was the only drug common to all cases.

2. Positive patch tests to atabrin, with negative controls, were obtained in 4 of the 5 cases. Control patients with severe dermatitis produced only 8.3 per cent. positives.

3. Autopsy and laboratory studies revealed no other aetiological agent.

4. The patients were admitted for totally unrelated diseases, but their terminal manifestations were strikingly similar.

5. Exfoliation was produced accidentally in the first patient with only 0.1 gm. of the drug.

6. The fifth patient was well controlled and would seem to leave no doubt that atabrin was the aetiological agent.

In view of the fact that a sensitive and as a control found that a patch test prepared from 0.1 gm of atabrine [atabrine dihydrochloride] to 10 cc of tap water gave the best results when read in 24 hours. Control tests were carried out on the opposite arm with preparations of other drugs.

This procedure only gave 3 per cent false positive reactions with normal skins and 8.3 per cent false positive reactions in patients with existing dermatitis.

The author states that the toxic reaction following atabrine which he has described may occur from extreme sensitivity on as little as 0.1 gm of the drug or may be the result of prolonged and repeated administration.

He considers that prompt recognition and treatment of these complications with such detoxifying agents as vitamin C and liver extract, intravenous glucose and plasma together with withdrawal of the drug may prove to be life saving although the mortality in his 5 cases amounted to 3 out of 5 patients.

[The extremely detailed clinical notes of the cases are not only fully informative but also of great interest.]

CAMPBELL K N & KERWIN J F Studies in the Quinoline Series II The Preparation of some Dialkylaminomethyl-4-Quinoline Methanols *J Amer Chem Soc* 1946 Sept v 68 No 9 1837-40 [Refs in footnotes]

CAMPBELL K N, HELBIG C H & KERWIN J F Studies in the Quinoline Series V The Preparation of some α -Dialkylaminomethyl-2-Quinoline-methanols *J Amer Chem Soc* 1946 Sept v 68 No 9 1840-43 [Refs in footnotes]

CAMPBELL K N, SOMMERS A H, KERWIN J F & CAMPBELL Barbara K Studies in the Quinoline Series VI The Preparation of some Substituted Lepidylamines. *J Amer Chem Soc* 1946 Sept v 68 No 9 1851-2

CAMPBELL K N, KERWIN J F, LaFORGE R A & CAMPBELL Barbara K Studies in the Quinoline Series VII The Preparation of some α -Dialkylaminomethyl-8-Quinoline Methanols *J Amer Chem Soc* 1946 Sept v 68 No 9 1844-6 [Refs in footnotes]

LEWIS A & TOTTER Mary M Studies on Synthetic Antimalarial Drugs XVI The Absorption, Distribution and Excretion of 2-*p*-Chlorophenyl-guanidino-4- β -Diethylaminoethylamino-6-Methylpyrimidine (3349) in Experimental Animals *Ann Trop Med & Parasit* 1946 July v 40 No 2 145-52 6 diagrams 13 refs

The authors, using a turbidimetric method, have studied the behaviour of this drug in the blood and plasma. The present experiments based on such behaviour and on that of quinine were carried out in seeking a guide to the mechanism of antimalarial action of the drug. Rats and mice were used as experimental animals. After oral administration to rats of 100 mg of compound 3349, the concentration of the drug in the blood and plasma concentration remains low, the drug is rapidly excreted in the urine and the intravenous elements of the blood are not affected.

being considerably higher in the cellular elements; while in tissues it is several hundred times as high. The highest concentrations were found in liver or lung, depending on the route of administration. The drug was still detectable in tissues six days after a small intravenous dose. It was excreted to a small extent in the urine but mainly in the faeces. Even when the drug was given intravenously, excretion into the small bowel was rapid, about half of it reaching this site in the bile. From recovery data it appeared that only negligible amounts of the drug were metabolized; its behaviour in the two species of animal was similar, and, in general, resembled that of mepacrine. During comparative experiments with quinine, a sensitive method for the estimation of that drug in plasma was developed; this consisted in extraction of the alkaloid from basified plasma, with a benzene-ethanol mixture. These solvents were in turn extracted with dilute sulphuric acid, and comparisons made with standards in a fluorimeter using a blue filter.

J. D. Fulton.

SPINKS, A. Studies on Synthetic Antimalarial Drugs. XVII. The Absorption, Distribution and Excretion of N_1 - β -Chlorophenyl- N_5 -Methyl- N_5 -Isopropylbiguanide (4430) in Experimental Animals and Man. *Ann. Trop. Med. & Parasit.* 1946, July, v. 40, No. 2, 153-62, 6 diagrams.

Similar methods to those described in the preceding abstract have been used to determine the fate of the antimalarial compound 4430 in rats and mice. Doses of 80 and 20 mgm. per kilo. were given by the oral and intravenous routes respectively. The drug was estimated by the methods previously described by the author [this *Bulletin*, 1946, v. 43, 398, 400]. It was found to be rapidly absorbed from the alimentary tract, maximum concentrations of 1.5 and 0.45 mgm. per litre being reached in blood and plasma respectively, while the concentrations in tissue were much higher, but soon fell. Five days after administration, 4430 was still detectable in urine, in which it is excreted to a greater extent than quinine or mepacrine, but only a small percentage of the administered dose was recovered from this source. Excretion into the small intestine from the blood occurs partly through bile. The amount recovered from faeces was less than in the case of 3349, described above, and this fact

..... ts, mice and rabbits

..... he drug was rapidly

..... were reached than

with similar doses of mepacrine. Maximal blood levels of 0.6 to 1.0 mgm. per litre were reached after the second or third oral dose of 200 and 400 mgm. respectively. Over a period of 5 days after administration to the human subject,

..... n urine.

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..... These

properties are believed to depend in part on variations in basic dissociation constants, and on the characters of the side chains.

J. D. Fulton.

BARBER, H. J. & WRAGG, W. R. Composition of the Antimalarial Drug R.63 and the Intra and Mause Hydrazine Hydrolysis of N-Substituted Phthalimides. [Correspondence.] *Nature*. 1946, Oct. 12, 514.

WATSON, R. B. & RICE, Margaret E. Notes on the Morbidity of naturally occurring Malaria. *J. National Malaria Soc.* Tallahassee, Fla. 1946, Mar., v. 5, No. 1, 7-12, 1 fig.

In 1941 the authors reported the results of mosquito-proofing of houses in three areas of the Tennessee Valley for malaria control [this *Bulletin*, 1942, v. 39,

that negroes had a greater relative number of infections

SERGEANT Ed & SERGEANT, Et Une simple et radicale "grande mesure antilarvaire" contre les anophèles le colmatage [Colmatage, a Simple and Radical Antilarval Measure] *Arch Inst Pasteur d'Algerie* 1946, Mar, v 24 No 1 24-8 1 map

This paper describes the successful use of colmatage in obliterating a large the land osit their

The vast marsh of Ouled Mendu near Dhioula in an malarial plain, which malaria had made uninhabitable for man and piroplasmosis for cattle was

flow down ravines to a canal to be discharged into the sea the average rainfall is 760 mm a year This water is heavily laden with silt A secondary canal was cut which carried the water to a series of rectangular basins surrounded by banks 40 to 50 cm high In these the silt was deposited and the clear water was drained from the last basin downstream Each year the position of these basins was changed In 5 years 245 000 cubic metres of silt were deposited on 35 hectares of land The pond and marsh had disappeared The reclaimed land is under profitable cultivation

Norman White

EADS R B Vertical Drainage for Mosquito Control on a Solomon Island Base. *J National Malaria Soc* Tallahassee Fla 1946, Mar v 5 No 1, 39-41, 1 fig

In the level areas of the Solomon Islands there are numerous depressions, usually less than 100 yards square and from 4 to 10 feet deep They are apparently of recent formation and may have been the result of earthquakes The water they contain requires attention though it is not very productive of anophelines

to connect the two filled with coral have been drained in a day The depressions have remained dry for ten months

Norman White

WILSON D Bagster Notes of some Investigations on Mosquito Larvicides. *East African Med J* 1946 Aug, v 23 No 8, 239-45

In an endeavour to improve larvicidal control of *Anopheles* in East Africa for military purposes certain materials were tested in the field, with the following results —

1. Di-nitro-ortho-cresol. An effective insecticide against locusts which proved of no value as a mosquito larvicide.
2. Malachite, a copper mineral. An effective agent for the control of freshwater snails but of no practical value as a larvicide.
3. Derris. The powdered root of *Derris elliptica* (2 lb. per acre), diluted with wood-ash, was found very effective, and most useful in irrigated vegetable gardens.
4. Gammexane. A dosage of 0.02 gramme per square yard (4 oz. per acre) in diesolene or used engine-oil was effective against the larvae of *Anopheles gambiae*; 0.05 gramme was lethal to all fauna. A similar dosage (0.02 gramme) of the crude powder in dust was not so effective.

The effectiveness of the anti-malarial oil mixture in use in East Africa was in doubt. After investigations based on the laboratory methods of DAVID [this *Bulletin*, 1943, v. 40, 16], the following mixture was finally adopted to rectify the main defect of lack of spreading power:—

Inland diesel	...	...	...	...	42 per cent.
Diesolene	..	..	...	...	31 "
Furnace oil	...	...	...	...	18 "
Power kerosene	...	...	...	...	9 "
Fatty acids	...	...	...	...	0.6 "

The spreading pressure is over 20 dynes per cm. and relative viscosity 1.00. Dosage of 5 gallons per acre kills 100 per cent. of larvae of *Anopheles gambiae*; the dosage usually quoted is 10 to 15 gallons per acre. [Similar difficulties were encountered in military malaria control work in West Africa. The use of DDT or gammexane in an oil of high spreading power will eventually replace the effective Malariol.]

R. Ford Tredre.

WHITE, R. Senior, GHOSH, A. R. & RAO, V. V. On the Adult Bionomics of some Indian Anophellines: with special reference to Malaria Control by Pyrethrum-Spraying. *J. Malaria Inst. of India*. 1945, Dec., v. 6, No. 2, 129-215, 3 charts. [46 refs.]

This paper starts with a critical review of the published results achieved in India by the spray-killing of adult mosquitoes with pyrethrum insecticides. These results have been more successful against *A. culicifacies* than against *A. minimus*.

Over a period of eight months, July to February, a laboratory study in plugged tubes was made of the duration of the gonotrophic cycle in six species

than did *A. fluviatilis* to complete digestion. A study was made of the relation of the digestive to the ovarian stages in *A. culicifacies* and in *Anopheles* of the *fluviatilis* group: very high correlations were found between abdomens in stages I-II, III-V and VI-VII, and ovaries in stages I, II-III and IV-V, respectively.

In 1937, Senior White showed that in the Chatikona area in the Jeypore Hills six species were concerned, in varying degree, in the transmission of malaria:—*A. culicifacies*, *A. fluviatilis*, *A. varuna*, *A. minimus*, *A. aconitus* and *A. ...* the investigation now their blood meals in each 12 specimens, as found in houses, stables and empty shelters, of the six species were determined. The average anthropophilic index of *A. culicifacies* was 27.2, much higher than is

usual in India but the species is negligible as a vector of malaria in the Jeypore Hills. Oöcysts have been found but no sporozoites. Probably few if any of this species survive ten days. The three chief vectors, *A. fluviatilis*, *A. varuna* and *A. minimus* had average anthropophilic indices of 84.2, 79.0 and 92.4, and sporozoite rates (in 1937) of 4.3, 6.1 and 4.4 respectively. *A. aconitus* is a comparatively rare species; it has been found once with oöcysts but never with sporozoites. Its average anthropophilic index was 15.5 (28.6 in houses). *A. jeyporensis* which had a much higher oöcyst rate than other non-vector species (sporozoites never found) had an anthropophilic index in houses of 27.8. It would seem that adult expectation of life is of importance in determining the vectorial potentialities of a species.

To study movement and longevity experiments were made with stained mosquitoes. Mosquitoes were dusted with printers coloured powders. A fallacy vitiated this work. Some of the dusted mosquitoes deposit some of the dust on cobwebs in the release hut; some of the unstained mosquitoes entering the hut come in contact with these webs and thus the stained population is continuously augmented. Watery stams were subsequently employed and showed that a very high percentage of *A. fluviatilis*, *A. minimus* and *A. jeyporensis* survived for over twelve days in the cold weather.

A. culicifacies remains in human dwellings after feeding until digestion is nearly complete. Vectors of the *fluviatilis* group leave the house when the cycle is only half complete and are thus vulnerable for spray killing for only one daylight period in each cycle.

Data on night catches in sprayed and unsprayed rooms are given. The entrance of *fluviatilis* is highest after midnight. Pyrethrum acts as a repellent to mosquitoes entering rooms.

Against the *fluviatilis* group spraying for six days each week is the most effective.

Further evidence is adduced that *A. varuna* covers more than one species or biological race.

Norman White

KARTMAN L & DA SILVA M M. Effect of Short Contact with DDT Residues on *Anopheles gambiae*. *J. Econom. Entom.* 1946 June v 39, No 3 356-9 2 figs.

The experiment was conducted in West Africa, during ten short periods of contact with a glass aspirator tube 10 mm in diameter on which a film of DDT had been deposited at a rate equivalent to 125 mgm per sq ft. After a short exposure, during which contact by legs and wings with the walls of the tube was ensured by its small diameter, the mosquitoes were blown out into a recovery cage. It was found that after 60, 30 and 5 second periods of contact most of them showed toxic symptoms ten to thirty minutes later. The 30 and 60-second contacts caused over 95% mortality.

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rel
permeable. The method of applying the DDT is not stated.] *J. R. Busvine*

VISWANATHAN D K, RAO T R & RAO T S R. The Behaviour of *Anopheles fluviatilis*. Part IV. Experiments on the Behaviour of Gravid Females. *J. Malaria Inst. of India* 1945 Dec v 6 No 2 243-5.

Fully gravid specimens of *A. fluviatilis* were dusted with gold or silver dust and liberated in a hut or a tent. Four experiments were made, during which

285 mosquitoes were so treated. Of these, 15 were found to return for a blood meal after oviposition, within a few hours of the time of release. Two others returned the following night.

Spray-killing of this species should be designed to destroy broods of 48 hours' and 72 hours' feeding cycles, irrespective of the season of the year. Spraying for two consecutive days, separated by one and two free days, alternately, is recommended, if concurrent antilarval measures cannot be carried out.

Norman White.

CARLSON, H. J., BISSELL, H. D. & MEYER, M. G. Antimalarial and Antibacterial Substances separated from Higher Plants. *J. Bacteriology*. 1946, Aug., v. 52, No. 2, 155-68, 1 graph.

Previous workers have obtained extracts from a variety of higher plants, which show activity against micro-organisms. The present workers have prepared extracts from more than 200 species of wild and domestic plants, and have tested their value *in vitro* and *in vivo* against pathogenic and non-pathogenic organisms. In the preparation of the extracts, fresh plants were ground with sand, saline was then added, followed by filtration through gauze. The pH level was then adjusted to approximately 7. Other preparations were also made by extraction with organic solvents or by means of steam distillation. By *in vitro* methods it was found that the extracts of five plants (buttercup, sagebrush, dwarf waterleaf, mountain pasque and juniper) showed activity. Tests against a number of organisms were made by the Oxford cup method as well as in the vapour phase. In the malaria tests, blood infected with *P. gallinaceum*, containing a definite number of parasites, was mixed with an equal volume of extract and incubated for six hours at room temperature. Chickens two weeks old were then inoculated intravenously with the mixture, and were observed over a period of four weeks. The extracts of the five plants named proved lethal to the parasites under these conditions. Sagebrush and

pathogenic protozoa. Mice infected with pneumococci were protected by mountain pasque extract. The extracts of sagebrush and waterleaf possessed anaesthetic properties for chickens and mice.

J. D. Fulton.

CANTRELL, W. & JORDAN, Helen B. Changes in the Infectiousness of Gametocytes during the Course of *Plasmodium gallinaceum* Infections. *J. Infect Dis.* 1946, Mar.-Apr., v. 78, No. 2, 153-9, 1 fig.

With a view to discovering the optimum moment for feeding *Aedes aegypti* on chickens infected with *P. gallinaceum* in order to obtain the maximum oocyst development, mosquitoes were fed at various stages of infection. It was found, as LUMSDEN and BERTRAM [this *Bulletin*, 1941, v. 38, 414] have previously noted, that the time of maximum infectivity did not always coincide with the peak of gametocyte number. In fact it was found that the maximum number of oöcysts occurred in mosquitoes fed on infected chickens the day before the peak of parasitaemia. On the day of the peak of parasitaemia, though gametocytes were considerably more numerous than on the previous day, they did not develop so readily in the mosquito. Thus, in mosquitoes fed on the day before the peak on two chickens, the ratio of gametocytes per 100 microscopic fields to oöcysts per mosquito was 37 and 77 respectively. At this time 10 per cent. of the red blood corpuscles were infected. On the following day, on which the peak of parasitaemia was reached, the ratio had fallen to 1.2 and 1. Certain changes in the appearance of many of the gametocytes were evident at the peak, and were increasingly evident after this. These changes

essential for their maturation in the chicken or the blood taken up by the mosquito may lack the nutritive substances necessary for their development. In order to test the nutrient hypothesis mosquitoes were fed on three chickens just before and just after transfusion with normal chicken blood. In the case of two of the chickens the oocysts in the mosquito fed after transfusion were increased two or three times but in the case of the remaining chicken there was no such increase. If the nutrient deficiency hypothesis would account for the reduction in the number of oocysts it might be expected that there would be a simultaneous reduction in the average size of the oocysts. This was found to be the case for mosquitoes fed on the more heavily infected chickens had not only fewer but also smaller oocysts.

C. M. Henry

TALL

Chickens were infected with *P. gallinaceum* or *P. lophurae* and 3-5 or 7 weeks after the initial infection were tested for homologous or heterologous immunity to these two parasites. Similarly chickens hyperimmunized by repeated superinfections were tested. The tests were carried out by injecting the immune blood of the infected chickens with heavy doses of parasites from the *P. gallinaceum* infection or had

blood stages of the parasite. On the other hand with *P. lophurae* the immunity decreases as the infection progresses and is increased by superinfection with

C. M. Henry

BRACKETT S & WALETZKY E with the technical assistance of Margaret BAKER Carrie O of Metachloridine amide Derivatives *Parasitology* 194

Metachloridine Nc1ccccc1S(=O)(=O)Nc2ccccc2Cl and some related compounds

have been found effective in causal prophylaxis and in treatment of *P. gallinaceum* infections of chickens provided they are given early enough

In its rate of action, metachloridine appears to resemble sulphadiazine in this infection, as reported by the authors [this *Bulletin*, 1946, v. 43, 713]. Previously, COATNEY & COOPER [this *Bulletin*, 1945, v. 42, 353] had shown that certain sulphanilamides also acted as causal prophylactics. Maximum tolerated doses of metachloridine have, however, been found unable to effect a cure of established infections. In sporozoite-induced infections, drug treatment was started two days before inoculation and continued for 10 days. When sulphadiazine was used as the standard suppressive drug the estimation of activity was based on the length of prolongation of the incubation period. In blood-induced infections, quinine served as standard, and drug treatment was begun on the day previous to intravenous inoculation of infective material, and continued for 4 days thereafter. The number of parasites present in the blood of experimental animals was then expressed as a percentage of that in the controls. The drugs were given in diet to the birds, which were kept alternately in light and dark for three-hour periods. Splenectomy followed by examination of blood smears served as a guide to the presence of a latent infection. The details of drug estimation are described and were based on the methods of BRATTON & MARSHALL (*J. Biol. Chem.*, 1939, v. 128, 537). Metachloridine and its bromine and iodine isomers were the most active of 42 substances tested, and possessed much greater activity than the standard drugs. Only those with heterocyclic groups possessed antimalarial properties. The biological activity of sulphanilamides and metanilamides appears to be different as their activity against various organisms does not run parallel and the latter are not so readily antagonized by *p*-aminobenzoic, while *m*-aminobenzoic was able to antagonize only the less active members of the group and its activity was not specific. Metachloridine has a low toxicity for animals and has given encouraging results in human malaria, but was inactive against a number of other protozoan parasites.

J. D. Fulton.

HUGHES, Carrie O. & BRACKETT, S. The Prevention of Sporozoite-Induced Infections of *Plasmodium cathemerium* in the Canary by Metachloridine. *J. Parasitology*. 1946, Aug., v. 32, No. 4, 340-44.

Besides acting as a causal prophylactic against *P. gallinaceum* infections of chickens, metachloridine (see previous abstract) can prevent infection of canaries by sporozoites of *P. cathemerium* injected subcutaneously or intramuscularly. It is also effective against blood infections. The drugs here tested were given in drinking-water while the birds were maintained continuously in the light. Estimations of the blood-level of drugs and their activity were made as described above. The following is the author's summary:—

"1. Metachloridine (2-metanilamido-5-chloropyrimidine) prevented sporozoite infections of *Plasmodium cathemerium* in four out of four canaries; one out of three birds and two, while 2-sulfanilamido-
d infections of *Plasmodium*
J. D. Fulton.

SEELER, A. O. & OTT, W. H. Studies on Nutrition and Avian Malaria. IV. Protein Deficiency. *J. Infect. Dis.* 1945, Nov.-Dec., v. 77, No. 3, 181-4, 1 fig.

The authors have shown that a *P. lophurae* infection in chicks on a diet deficient in protein runs a more severe course than in chicks on a diet containing adequate protein. When chickens on a high protein diet are inoculated with

severity of the infections. It was noted also that chickens on protein-deficient diets did not rid themselves of parasites as readily as did chickens on a high protein diet. It has recently been shown by CANNON and his collaborators that the effect of protein deficiency on avian malaria is C. M. Wenvon

FALLIS A. M. *Plasmodium circumflexum* (Kikuth) in Ruffed Grouse in Ontario
J Parasitology 1946 Aug v 32 No 4 345-53 7 figs

FLETCHER D. E. & RIGDON R. H. Neurologic Manifestations associated with Malaria in Ducks. *Arch Neurology & Psychiatry* 1946 Jan v 55 No 1 35-42 4 figs [14 refs]

Ducks inoculated intravenously with heavy doses of blood infected with *P. lophurae* acquire heavy infections in which as many as 450 of every 500 red blood cells are infected. These ducks usually die before the infections progress to the point at which the infected blood cells are two and a half millions to half a million. In the case of ducks which recovered after the crisis malarial parasites disappeared completely from the circulating blood and the ducks recovered to such an extent that they were indistinguishable from ducks which had not been submitted to infection. However a few weeks later the majority of these ducks showed signs of neurologic disturbances such as ataxia.

most extensively damaged. The suggestion is made that anoxia which results from the anaemia and is later aggravated by vasomotor instability and circulatory failure is the factor responsible for these pathological changes. C. M. Wenvon

SERGEANT Ed & SERGEANT Et. La température des canaris sains ou paludeens [The Temperatures of Healthy and Malarial Canaries] *Arch Inst Pasteur d'Algerie* 1946 Mar v 24 No 1 51-6 4 figs

A comparison of the temperature variations of normal canaries and those suffering from *P. relictum* infection has shown that there are no measurable differences in the two groups. The temperatures taken in the oesophagus in the rectum and under the wing of normal birds show considerable variations.

THOMPSON, P. E. Effects of Quinine on Saurian Malarial Parasites. *J. Infect. Dis.* 1946, Mar.-Apr., v. 78, No. 2, 160-66, 3 figs.

For the experiments described in this paper the lizards *Sceloporus undulatus undulatus* and *Anolis carolinensis* were inoculated with *Plasmodium floridense*, and *S. undulatus cansobrinus* with *P. mexicanum*. In the first test two specimens of *S. u. undulatus* showing parasites in the blood were inoculated intra-abdominally with daily doses of quinine (140 mgm./kgm.). The treatment was started on the 18th day after inoculation. One of the lizards died after the 4th injection and the other after the 8th, as a result of the toxic action of the heavy doses of quinine. During the treatment there was no reduction in the number of parasites in the blood, but pronounced changes occurred in their morphology. These were the formation of large vacuoles in many of the parasites, irregularity in their outline, and loss of affinity for stains. Both asexual and sexual parasites were affected.

In a second experiment five strains of the parasite in *A. carolinensis* were studied in ten lizards, each strain in two lizards. One of each pair was treated and the other kept as control. The dose of quinine was reduced to 75 mgm./kgm. and this was administered every second day till 12 doses had been given. At the end of the course the parasites were difficult to find in the blood and a few days later it was impossible to detect them microscopically. During the course of the experiment the number of parasites in the blood of the treated lizards decreased to 1/10 of the original number. The lizards remained healthy for 69 days.

strain of *P. floridense*. Three of the lizards were treated, the dosage being the same as in the second experiment, the first injection being given on the 39th day after inoculation. Six [? five, see Fig. 2] doses were given, with results similar to those in the second experiment. The effect of the drug on the parasites was still further tested by counting the number of merozoites in both treated and untreated lizards, commencing on the first day of treatment. In untreated lizards the merozoite number varied from 11.2 ± 0.4 to 14.4 ± 0.8 , while in the treated lizards the number was reduced and varied from 7.7 ± 0.4 to 10.0 ± 0.5 .

Similar experiments were carried out on *P. mexicanum*, which produces numerous exoerythrocytic forms. These occur in all the cells of the myeloid series, as well as in cells of the lympho-macrophage system. In the circulating blood about 70 per cent. of the parasites produce pigment. These are in the s and polychromatophile rasites which lack pigment.

Two lizards were treated and remained high. This was accounted for by the fact that the drug acted only on those parasites which occurred in cells containing haemoglobin. The changes were similar to those seen in *P. floridense*. The parasites in the haemoglobin-free cells were not affected. Brain smears from treated lizards contained as many large asexual parasites as occurred in smears from untreated lizards.

The result of the experiments shows that the action of quinine on the malaria parasites of cold-blooded animals is similar to its known effect on parasites in various warm-blooded animals. C. M. Wenyon.

MANWELL, R. D. Bat Malaria. *Amer. J. Hyg.* 1946, Jan., v. 43, No. 1, 1-12, 1 text fig. & 16 figs. on 1 pl. [37 refs.]

The study described in this paper, in which the literature dealing with bat malaria is reviewed, was carried out on films from the blood and organs of two species of bat which are commonly infected with malaria parasites in New

The 202 new African cases are tabulated according to the circumstances under which they were diagnosed (i.e. by mobile units at various medical stations on presenting the *passport sanitaire* etc.) and also according to the stage of the disease. The analysis shows (as has so often been shown) that the percentage of early cases is higher among cases diagnosed by mobile teams than among cases diagnosed at fixed dispensaries.

	(a)	(b)	(c)
Mobile units	62%	4%	35%
Fixed dispensaries	14%	4%	82%

On the subject of treatments administered and clinical progress the Report goes into considerable detail with numerous tabulations and long case notes. Treatment of early (lymphatico-blood) cases were not entirely successful. Of 30 such cases followed up for 3 months to 1 year only 22 were considered to have responded satisfactorily. Among 25 early cases treated by antrypol alone (6 weekly injections maximum dose 1.2 gm) only 17 were regarded as successful 1 was unsatisfactory in 3 the disease progressed in 2 there were relapses and there were 2 deaths. Toxic effects attributed to the drug in 2 cases were loss of weight albuminuria and a generalized pruriginous erythema.

Late cases were treated by combined courses of antrypol and tryparsamide or 270F (Orsanine) followed by tryparsamide. For results the original Report heavily laden with detail should be consulted.

Old Cases—Ample details are also given of the progress (generally satisfactory) of 9 European cases whose earlier histories have been recounted in previous Annual Reports and of 576 previously treated African cases. There were 27 deaths among the latter 22 of which are ascribed to trypanosomiasis. All but 3 of these 22 had been diagnosed and treated in a late stage of the disease.

The problem of reinfection—A case is described in which trypanosomes were again found in the blood six years after apparent cure. This is regarded as yet another instance of reinfection a number of which some as long as ten years after treatment have been described and discussed in Annual Reports of recent years from the Brazzaville Institute.

Trials with *p*-arsenosophenylbithyric acid—Full details are given of these trials. The compound here referred to as para arseno was introduced by EAGLE (see this Bulletin 1945 v 42 15 304 970 1946 v 43 1017) and it is this which has previously been designated as 70A [WEINMAN and FRANZ *ibid* 1946 v 43 207]. A total of 70 patients were treated by daily intravenous injections of 0.4 or (less commonly) 0.3 mgm per kilo for periods of 5 to 20 days. The majority of 20 patients treated in the stages of meningeal or cerebral involvement did not respond favourably. Combined treatment 5 to 9 daily injections of para arseno followed by 6 to 12 injections of tryparsamide was administered to 7 patients in the later stages of infection. Although the cerebrospinal fluid picture improved the effect was on the whole considered to be less favourable than after the customary course of 2 injections of orsanine followed by 10 to 12 injections of tryparsamide in the lymphatico blood stage. 0.4 mgm per kilo. Tr involvement developed.

period of 7 months. The results in this stage of infection were therefore considered to be definitely inferior to those which would have been obtained with the established remedies. [The survey by EAGLE, this *Bulletin*, 1946, v. 43, 1017, includes consideration of these Brazzaville cases. He concludes that 90 per cent. of early cases may be cured by 12 to 14 daily injections of 0.5 mgm. per kilo.]

E. M. Lourie.

GLASGOW, J. P. The Seasonal Abundance of Blood-sucking Flies in a Grassed Woodland Area in Central Tanganyika. *J. Animal Ecology*. 1946, May, v. 15, No. 1, 93-103, 2 figs.

These observations were carried out in conjunction with routine tsetse-fly rounds at Npwapwa, Tanganyika, and were made in the hope of discovering "indicator species" which would point the way to an understanding of tsetse distribution and activity.

The following species were caught off a bait ox, and records were kept between July 1940 and December 1942.—Male and female *G. pallidipes* and female *Hippobosca longipennis*, *Phara speciosa*, *Tabanus atrimanus*, *T. insignis*, *T. taeniola*, *T. maculatus*, *Haematopota mactans*, *H. nobilis*, *Mesomyia fallax* and Pangoninae, a mixture of *Dorcalaeus compactus* (Austen), *Pangonius oldi* (Austen), *Nuceria nerei* (Austen) and two others, whose identity is uncertain.

The author gives a table and graphs showing the flight season and comparative densities of most of these species; some species are combined owing to possible errors in identification at the time. He states that there is little doubt that *Phara speciosa* and the Pangoninae have but one generation per year; *Haematopota nobilis* having a succession of generations, and *Mesomyia fallax* gives two populations each year (September and November). VANDERPLANK [this *Bulletin*, 1945, v. 42, 760] is quoted as saying that *T. taeniola* had the same flight season at Shinyanga in 1940. None of these species was suitable as an "indicator species", and the maximum numbers of adults do not normally occur in the same month in subsequent years, nor do the flight seasons coincide exactly. The possibilities of mechanical transmission of cattle trypanosomiasis are discussed. [Unfortunately the author does not state the time of day at which the fly-rounds were carried out, and whether they were carried out at the same time. The activity of many of these species is correlated with temperature and light intensity, and will vary considerably according to the prevailing weather.]

F. L. Vanderplank.

JACKSON, C. H. N. An Artificially Isolated Generation of Tsetse Flies (Diptera). *Bull. Entom. Res.* 1946, Sept., v. 37, Pt. 2, 291-9, 2 figs.

The author wished to study what happens to *Glossina morsitans* in nature, particularly changes which occur with advancing age. He chose an area in which this species did not occur [though the reviewer may say from personal knowledge that the area was not grossly unsuitable to it]. He introduced pupae from elsewhere and allowed a very large number of flies to emerge during three consecutive days, after which the unhatched pupae were removed. It follows that any flies of this species which were subsequently caught must have travelled from this one spot, and have been of an age known within a narrow margin. The author has, in fact, carried out an experiment which adds precision to what has already been learned from wild flies, though it must be admitted that the environment was not strictly natural to this species.

After the liberation flies were caught in a standardized way almost daily for unt of
It was
third
ortion
 showed evidence of having had a meal In studying the fraying of the wings

between age and fraying Studies of the amount of water fat etc were also made They are of value because they give a check to data collected from wild flies of unknown age

From the recaptures it appears that the average distance travelled by the male is nearly four hundred yards in the first week rising to nearly a thousand in the fourth Many individuals travelled beyond a thousand yards and a few beyond two thousand All the measures are taken of course direct from point to point

So few females were recovered that little has been added to our knowledge of that sex

Glossina swy merton occurred in small numbers in the area of the experiment and there is little doubt that some cross breeding between it and the liberated *morsitans* must have occurred But it is certain that there was a good deal of breeding among the *morsitans* for a second generation of flies was captured

Will

γ (p arsenosophenyl) butyric acid $\text{OAs} \langle \text{C}_6\text{H}_4 \rangle \text{CH}_2\text{CH}_2\text{CH COOH}$ was brought into prominence by EAGLE *et al* this *Bulletin* 1945 v 42 15 354
 The present authors confirmed that it acted on trypanamide resistant

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CLAESSENS, H. Un mot sur la Propamidine iséthionate, utilisée à titre préventif, contre la trypanosomiase humaine. (Note préliminaire.) [Propamidine isethionate as a Prophylactic against Sleeping Sickness.] *Ann. Soc. Belge de Méd. Trop.* 1946, June 30, v. 26, Nos. 1/2, 7-12.

An investigation of the protective power of propamidine isethionate was carried out in two villages, of 77 and 82 inhabitants respectively, on the Kibombo-Kindu road, which is in a highly endemic sleeping sickness area of the Belgian Congo.

Nine infected persons were discovered in the two villages on March 7th, 1945. They were given full courses of treatment (detailed in abbreviated protocols case by case, at the end of the article), and all the other inhabitants were given an intramuscular injection of propamidine, 5 mgm. per kilo. body weight, in about 10 cc. water or physiological solution. Untoward temporary effects were (1) fever, (2) salivation and diminished sense of taste, and (3) a pruriginous papular eruption in a woman severely affected by macular leprosy.

Six months later, the location of the villages having been shifted meanwhile from the old to the new Kibombo-Kindu road, 131 of the combined population of 159 were re-examined (and re-injected with propamidine). Trypanosomes were discovered in 2 cases. One was judged to have become infected since the original injection of propamidine; no trypanosomes had been seen in lymph-gland juice 4 and 5 months subsequent to that injection, and, at the sixth month, when trypanosomes were seen in the gland juice, the cerebrospinal fluid was normal. The other case was one of the 9 who had been diagnosed at the ne injection of propamidine injection).

. draws the conclusion that propamidine isethionate, used as he has described, does not confer protection, with absolute certainty, for a period of six months. E. M. Lourie.

LEERAERTS, W. Etude et bayérisation d'un foyer actif et arsénicorésistant de trypanosomiase humaine. [Investigation, and Prophylactic Treatment with Suramin, of an Endemic Area of Arsenic-Resistant Sleeping Sickness.] *Rec. Travaux Sci. Méd. Congo Belge.* 1946, May, No. 5, 233-43.

This is an interesting account of (1) the apparent development of arsenic-resistant sleeping sickness as the predominant type in an endemic area, (2) the methods of identifying cases of this type; (3) methods of treating such cases; and (4) eradication of the endemic focus by treating the entire population with Suramin (Antrypol, Bayer 205, Moranyl).

(1) *Development of arsenic-resistance.*—The work was carried out in the Feshi territory, Kwango District, Belgian Congo, about 7°S. latitude 18°E. longitude. The inhabitants are Basukus, a very primitive, improvident and ill-nourished people. The first case came to notice in 1937, and, by 1942, a total of 111 cases had been diagnosed in 5 villages of about 800 persons. In spite of repeated treatments, clearing of bush, displacement of villages, etc., the infection-rate in 1942 was still as high as 7 per cent.

Until 1939, the usual treatment was 1 injection of Moranyl, followed by 12 of Tryponarsyl. In 1940, Tryponarsyl alone was given. Since 1941, van Hoof's system has been adopted; this consists of a preliminary injection of 0.06 gm. kilo. followed by an examination of the s later. If trypanosomes are no longer Tryponarsyl, but if they are still present section 3 below) is instituted. Results have been as follows:—

	1937-9	1940	1941-2
Cases	16	14	66
Cured	15	10	23
Died of S S	1	1	1
Ocular troubles	1	1	1
Arsenic resistance	0	3	42

(of whom 11 died)

It seems then that there has been a considerable development of arsenic resistance in the area between 1937 and 1940 during which period Trypanarsyl was the main stand-by for treatment.

(2) *Identification of arsenic resistance*—The poor results in 1941-2 in spite of the adoption of van Hoof's system led the investigator to question the reliability of this method. Among 16 new and 13 old cases subjected to the

resistant they were recognized as such by the fact that daily blood examinations revealed trypanosomes at varying periods from 3 to 33 days in spite of courses of weekly Tryparsamide injections started on the 7th day since the test dose.

Dr van Hoof's comments on being informed of these results were that, whilst a positive result clearly demonstrates arsenic resistance a negative

immediately prior to that injection.

(3) *Methods of treating arsenic resistant cases*—The so-called Rodham course is stated to be indubitably the most effective but it is also extremely toxic. It should be given only under very general conditions. Of 34 patients well 5 died during the first week 2 of the end of treatment. The course consists of—

1st and 3rd day Antrypol 1 gm

4th 5th and 6th day Tartar emetic 0.07 gm 0.09 gm and 0.1 gm

7th 14th and 21st day Tartar emetic 0.1 gm with Antrypol 1 gm in the same syringe

followed by 10 injections of Tryparsamide

was treated with Antrypol (or Bayer 20b) in December 1942 and again 3 months later. On each occasion the dose for male adults was 1.5 gm for females 1.25 gm and for infants about 0.03-0.035 gm per kilo body weight.

Meticulous precautions were taken against toxic effects. Injections were given only between 5 and 10 a.m. on an empty stomach after which the subject was required to rest in the shade for 2 hours. He was then seen again by the physician before being allowed to go home and he was exempted from work for 8 days. The urine was examined for albumin from 2 to 5 days after treatment but was almost invariably normal. Toxic effects were negligible.

The procedure was regarded as entirely successful in clearing the endemic focus. Whilst 19 cases had been discovered at the time of the first injection (and given full courses of treatment), none was found 3 months later, although numerous cases were still to be found in the neighbouring sub-sector, across the River Nsaye. Later examinations, at intervals up to the end of 1945, failed to reveal a single case, except for one person in a typical late stage of infection, who must surely have been infected already, though not recognized as such, when she had received her 2 Antrypol injections about 15-18 months earlier.

The author is most enthusiastic about the value of prophylactic treatment with Suramin, which he regards as the prime method for dealing (by drug-treatment) with delimited endemic areas, particularly where infection is of the arsenic-resistant type.

E. M. Lourie.

MORRIS, K. R. S. The Control of Trypanosomiasis by Entomological Means. *Bull. Entom. Res.* 1948, Sept. v 37, Pt. 2, 201-50, 5 text figs., 3 maps & 12 figs. on 2 pls. [18 refs.]

The author gives a stimulating account of reclamation against tsetse in the Northern Territories of the Gold Coast. His base is entomological, but his scope includes trypanosomiasis in man and animals, and consideration of social

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man was over

5 per cent., in an area of thirty thousand square miles inhabited by about 1,250,000 people. The particular district in which he worked, near Lawra, Northern Territory, Gold Coast, had a rate of 4-7 per cent. in a considerable area, and there were 1,100 admissions to hospital for trypanosomiasis in 1939. Parts of the district had become depopulated, apparently owing to this disease (though whether death or emigration was the more important is not known). Game and *G. morsitans* had spread into the land abandoned by man, and people were crowded on watersheds and ridges; here they were safe from tsetse, but the density of man and stock was producing serious erosion.

In clearing bush against fly (*G. palpalis* and *tachinoides*) the author distinguishes protective and eradication work. Both, it is to be understood, are linear, along banks of water-courses. Protective clearing is often made where a road crosses a stream, and is carried up and down stream; of this work he has had long experience. He finds that a total clearing of 300 to 400 yards will reduce fly (both species) to about half what one would get in an uncleared area. If the clearing is lengthened to a mile it will still only be about 90 per cent. efficient, and even if it is three to five miles long an occasional fly will still reach the middle of it. Such flies could hardly have any importance as transmitters of human trypanosomiasis, but (owing to the much higher infection rate) they might transmit trypanosomes to cattle, and they might succeed in recolonizing an area which had been rendered fly-free. The effect on human trypanosomiasis of a large number of protective clearings is generally slow and not very great; for instance, in the Wa area a 70 per cent. reduction in cases followed after several years. [The author would, however, agree that it is most difficult to assess the results of this work. The population at risk or infected is not known. Admission to hospital, used as a measure of incidence, may be much affected by the popularity of one doctor. The disease in man is often chronic so that a lag is expected before the results of work are to be seen.]

Not satisfied with protective clearings, Morris turns to eradication. His general theory is that as *G. palpalis* and *tachinoides* are closely dependent (particularly in the dry season) on shelter in riverside fly belts, and as these

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Thus method has been applied to the Kamba valley. With its tributaries it has a total length of 250 miles of which 105 miles were a dry season breeding place of the two species of tsetse. There were 33 000 people in the area. Applying the method defined above an enormous reduction in flies taken by fly boys was recorded though neither *G. palpalis* nor *tachinoides* was completely eliminated. There was a very large reduction in cases of sleeping sickness at the local hospital about 1 000 people returned and reoccupied farms on good riverine land cattle were brought in though they did not remain entirely free of trypanosomiasis.

The paper contains technical details on the labour and cost of digging up the stumps of certain species of trees which regenerate very freely. An appendix gives costs but much too briefly. Some la —

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the trypanosomes) and the number of

flagellates per cc medium was determined by counting in a haemocytometer

after various intervals. There was no inhibitory action on *B. coli* or *S. aureus*.

Typical experiments are shown in table I.

On the strength of the above

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Samples

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compounds, biotin (50 per cc. medium), biotin ester (2 per cc. medium), destio-biotin (10 per cc. medium), biotin amide (20 per cc.) had no inhibitory action on the growth of the above organisms. By adsorption methods (using kaolin, Fuller's earth and norit) it was also evident that there was no relationship between biotin content (as determined by assay on *Saccharomyces cerevisiae*) and inhibitory action on the flagellates.

"Conclusion.—Biotin concentrate contains a substance which inhibits the growth of *Trypanosoma cruzi*, *T. lewisi*, *Leishmania donovani* and *L. infantum*. The active substance is not biotin."

GUYANE FRANÇAISE · RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR DE LA GUYANE FRANÇAISE ET DU TERRITOIRE DE L'ININI PENDANT L'ANNÉE 1945 [FLOCH, H. Director]. (Publication No. 125. 1946. Cayenne.) pp. 83-5. Maladie de Chagas (ou Schizotrypanosomiase humaine) [Chagas's Disease.]

In 1944 investigations were undertaken to determine the numbers of laboratory-bred *R. pictipes*, *R. prolixus* and *T. rubrofasciata* infected by a single feed on guinea-pigs which had themselves been infected by strains of *T. cruzi* obtained from *Didelphys marsupialis*. The numbers examined were *R. prolixus* 80, *R. pictipes* 72, *T. rubrofasciata* 91, and metacyclic trypanosomes were found in 68, 65 and 29 respectively, or 85, 90 and 31 per cent.

E. DIAS in 1940 demonstrated that *R. prolixus*, the chief vector in Venezuela, was more readily infected by a Venezuelan strain of *T. cruzi* than by strains from elsewhere and confirmed this analogously with *P. megistus* and *T. repelans* for Brazilian strains, and he suggested a series of xenodiagnostic tests as a means of recognizing the most dangerous of the vectors in places where Chagas's disease existed. According to this the above results would indicate that the French Guiana strains are specially adapted to *R. pictipes* and *R. prolixus*. Furthermore, that these strains are not well adapted to *T. rubrofasciata*. Nevertheless, in Cayenne, *T. rubrofasciata* is found heavily infected with a trypanosome which is not inoculable with success into laboratory animals, it is concluded that this trypanosome is, therefore, not *T. cruzi*, but is probably a trypanosome of bats, or, in Dias's opinion, possibly *T. conorrhini*.

It has been thought possible that cats become infected by eating infected mice, and Dias has reported finding the trypanosome in the blood 17 days after the meal, and the same may occur in dogs. Attempts have been made to infect three guinea-pigs by giving them bread containing infected Triatomidae, but so far without success. It may be, of course, that the cats when devouring the mice acquire small wounds of the buccal mucosa and infection may thus be by "submucous inoculation".

H. Harold Scott.

EARLE, K. V. Penicillin in Chagas's Disease. With a Note on Chagas's Disease in Ecuador. *J. Trop. Med. & Hyg.* 1946, Aug.-Sept., v. 49, No. 4, 74-6, 1 fig. [14 refs.]

There is here recorded the case of a man of 22 years, an Ecuadorean, with multiple infection by *T. cruzi*, *E. histolytica*, *P. vivax*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Strongyloides stercoralis*. The signs and symptoms of the *T. cruzi* infection were typical except for the fact that palpebral and facial oedema, Romaña's sign, followed the findings of many trypanosomes in the blood. Mapharsen was given because, says the author, neither Bayer 205 nor trypanamide was obtainable [nothing is said of the drug usually given with success in Chagas's disease, Bayer 7602], but was not effectual, so penicillin was tried—five injections each of 10,000 Oxford units at two-hour intervals on each of two days.

The trypanosomes disappeared after the 3rd injection and except for severe headache the symptoms cleared up. A second similar course of penicillin was however administered after an interval of three days. During the succeeding two months for which the patient has been under observation trypanosomes have not been found and the patient has felt perfectly well. The penicillin was administered intravenously because it was thought that the pain of intramuscular injections would scare the patient into defaulting.

Ecuador says Dr Vigors Earle has not been named as a country in which Chagas's disease exists. *Triatoma dimidiata* is the only known intermediate host; other *Triatomas* are present *T. carrione*, *T. senosa* and *T. coxo-rufa* but these are not known to be vectors. An armadillo is common in rural districts but it has not been proved to harbour the trypanosome.

H. Harold Scott

PONCE CABALLERO L. Enfermedad de Chagas en Bolivia. Nota preliminar [Chagas's Disease in Bolivia] *Rev Med Chile* 1946 May v 74 No 5 349-51

The author carried out an investigation in Colcapirhua, a place with a population of 2000 situated 10 kilometres east of Cochabamba. He visited five

that the bugs were abundant in their homes and that they were frequently bitten. Ten were tested by xenodiagnosis and six gave a positive result. One was an acute case with palpebral oedema, enlarged preauricular gland, enlarged spleen and liver fever, headache and malaise. In another case the xenodiagnostic test was negative but the blood gave a positive Machado-Guerreiro reaction. The other five had no subjective symptoms but they had

These cases show yet once again how rare it is to find *T. cruzi* in the blood; one

knows that it multiplies in the tissues and that its presence in the blood is but transient.

H. Harold Scott

LEISHMANIASIS

NORMAN A. P. Latent Period in Kala-Azar [Correspondence] *Lancet* 1946 Sept 21 437-8

The author, after referring to the latent period in Kala-Azar, states that with

The patient, a man, aged 40, was brought to the hospital from the 'biddle East from April 1945. He had been in Italy for 18 months.

In the summer of 1945 he noticed that his belt seemed tight on exercise.

puncture for Leishman-Donovan bodies, proved negative. In November, laparotomy was performed, and the tumour proved to be a grossly enlarged spleen. Splenic puncture smear and cultures were negative for Leishman-Donovan bodies.

In December, as there was no improvement, the patient was treated for kala azar. He was given a course of stilbamidine, 0.075 gm., followed by 0.15 gm. daily, to a total dosage of 2.25 gm. Sweating decreased after a week, and the temperature dropped suddenly on the 13th day of treatment and remained low.

Later in December, a culture of marrow blood showed "distinct leptomonas forms of Leishman-Donovan bodies, fresh preparations showing characteristic motility."

Progress was slow, but excellent. In February 1946 a course of urea stilbamidine was given. In March the spleen was barely palpable and the anaemia was clearing up.

In April, the patient reported that he felt well, except for some numbness of the forehead, cheeks and lips.

Apart from the long latent period and the difficulty in diagnosis, the author notes the dangers of fifth nerve involvement which may follow the use of stilbamidine.

H. J. O'D. Burke-Gaffney.

SARROUY, COMBE & CLAUDE. A propos d'un nouveau corps antimonie (216S R.P.) dans le traitement du kala-azar infantile. (Note préliminaire.) [Treatment of Infantile Kala Azar with a New Antimony Preparation. Preliminary Note.] *Algérie Méd.* 1946, May-June, No. 3, 239-40, 1 chart.

The authors in studying the efficacy of a new product for the treatment of infantile kala azar, put at their disposal by Messrs. Specia and named 216S R.P. (antimoniate of N methylglucamine) obtained spectacular results with their first patient.

This was a child of 5½, with a prolonged fever, and an enormous spleen and wasting. After full examination, numerous Leishman-Donovan bodies were found in a marrow smear.

The new drug, which is made up in a neutral and stable form, ready for injection, in 5 cc. ampoules, was given as follows, in daily doses intramuscularly:

"1st day: 3 cc. (or 0.9 of 216S R.P. or 0.255 of antimony) [presumably grammes]

2nd day and following days: 5 cc. (or 1.5 gm. of 216S R.P. or 0.425 gm. of antimony).

In all, the child received 18 injections (or 26.4 gm. of 216S R.P. or 7.48 gm. of antimony."

[These doses appear to be very high for a very debilitated child of 5½, stated to weigh only 16 kgm. See below.]

The temperature fell dramatically on the day after the first injection and remained low.

Early disappearance of the Leishman-Donovan bodies took place on the eighth day of treatment.

The splenomegaly resolved rapidly. The child became well and happy and no signs of intolerance to the drug occurred, other than a slightly subnormal temperature for 2½ days.

The authors consider that this result was strikingly superior to those commonly obtained with "Pentastib", which in effective doses frequently produces signs of intolerance.

In mice the new drug proved to be only half as toxic as Pentastih. The dose has not yet been fixed and the authors are engaged in studying this problem but they consider the present spectacular result worth noting.

[The doses of antimony quoted in the original paper appear to be considerably above the margins of safety commonly accepted. For example NAPIER *et al* (see this *Bulletin* 1938 v. 35 181) referring to the use of the antimony product Bayer 561 in the treatment of kala azar give the total amount of antimony administered over 1 to 3 weeks as 0.96 to 1.79 gm. a maximum less than one-quarter of that quoted by the authors of this paper.]

H. J. O. D. Burke-Gaffney

DURAND P. BENNUSSA S. & CARLANA M. Traitement du kala azar par un nouveau composé stibic le 216S R P (premiers résultats) [Treatment of Kala Azar with a New Antimonial, 216S R P] *Bull et Mem Soc Med Hopit de Paris* 1946 Nos 24 25 399-409

The authors report on the results of treatment of the first six cases of kala azar in mice.

100 mgm administered intravenously. The six cases of kala azar in which the drug was tried comprised five in children varying in age from 14 months to 14 years and one in an adult of 36 years. It was administered intramuscularly in a 30 per cent solution each 5 cc containing about 1.5 gm of the drug representing about 0.5 gm of antimony. The youngest child of 14 months

old of 4½ years
w weeks later
id two courses
while another

child of the same age was given a course of 10 injections of 5 cc followed later by a second course of 13 injections of 10 cc. A boy 14 years of age had two courses of 15 injections of 10 cc. The adult was given two courses the first being of 17 injections of 20 cc. As a rule the injections were given every two

to permit the conclusion that a permanent cure has been obtained. Three of the patients one of whom had a history of three years duration had relapsed after treatment with diamidine. The new drug is rapidly excreted by the kidneys. In healthy subjects all trace of antimony has disappeared from the urine in 24 hours. In cases of kala azar excretion is less rapid for after 36 hours traces of antimony could still be detected in the urine but 12 hours later traces could no longer be found.

C. M. Wenyon

FEVERS OF THE TYPHUS GROUP

NEUFJAN G. Etudes sur les rickettsioses. III Coloration et culture des rickettsias. Studies of the Rickettsial Diseases. III Staining and Culture of the Rickettsiae. *Rec Tra et Sci Med Congo Belge* 1946 May No 5 142-60 20 figs

The author gives further details of the technical methods employed by him in obtaining the extraordinary results mentioned in his previous paper [this

Bulletin, 1946, v. 43, 324]. He claims to have been the first to cultivate rickettsiae in the absence of living cells; his method is very simple. 5 cc. of blood is mixed with 1.0 cc. of "liquoïde Roche (1.0 per cent.)" and kept at room temperature for 24 hours, equal parts of this and Tyrode fluid are mixed and kept at room temperature. Smears of the mixture are examined at daily intervals. It is claimed that in cases of rickettsial disease the organisms can be found after 24 hours, when the infection occurs in latent form it takes several days to obtain an abundant growth.

The finding of rickettsiae in urinary sediment in cases of Congo typhus is again mentioned as being a method of early diagnosis, it is stated that the organisms persist "for months, if not longer"—"another proof, if this were needed, of the permanence of the infection."

John W. D. Megaw.

NEUJEAN, G. & DOUCET, G. Etudes sur les rickettsioses. IV. Aspects cliniques du typhus congolais. [Studies of the Rickettsial Diseases. IV. Clinical Aspects of Congo Typhus.] *Rec. Travaux Sci. Méd. Congo Belge*, 1946, May, No. 5, 161-95, 3 pls. & 21 charts.

The senior author has already described some results of his investigations into the typhus fevers of the Belgian Congo. In this paper further details are given of the clinical features of the disease, but these are stated in general terms. The clinical picture as described is in keeping with that of a fever of the typhus group. The laboratory procedures regarded as useful in diagnosis are:— (1) The Weil-Felix reaction, which, as stated in the earlier papers, has changed in type during the course of the investigation; at first high titre reactions with *Proteus OX19* strains were found, afterwards "cases with high titres have become rare; the XK type of agglutination, formerly feeble or negative, has become more frequent." (2) "The presence, even in traces, of albumin in the urine." (3) The finding of rickettsiae in urinary sediment is regarded as one of the best methods of diagnosis.

John W. D. Megaw.

NEUJEAN, G. Etudes sur les rickettsioses. V. Valeur des réactions sérologiques. V. Congo Typhus and Yellow Fever. *Travaux Sci. Méd. Congo Belge*, 1946, May, No. 5, 196-8.

In view of the frequent occurrence of jaundice in cases of typhus fever in the Belgian Congo, and of the occurrence of black vomit and albuminuria in severe attacks, the author arranged for a series of Weil-Felix and mouse-protection (yellow fever) tests in 45 persons, all of whom were suffering from, or convalescent from, typhus fever.

In 11 sera of patients who had been vaccinated against yellow fever the mouse-protection tests were positive, in all the others the reaction was negative or doubtful.

The Weil-Felix reaction (*Proteus OX19*) was positive at titres ranging from 1-80 to 1-320 in 13 cases. The *OX2* reaction was positive at the same titres in 6 cases. The *OXK* titre was 1-80 in 26 cases and 1-40 in the rest. [These *OXK* titres can hardly be regarded as significant.]

The author concludes that the mouse-protection test for yellow fever retains its full significance when carried out on persons attacked by typhus fever.

John W. D. Megaw.

NEU JEAN G. Etudes sur les rickettsioses VI Infections latentes et aiguës décelées par l'inoculation au cobaye [Studies of the Rickettsial Diseases VI Latent and Acute Infections disclosed by Guinea-pig Inoculation] *Rec Tra aux Sci Méd Congo Belge* 1946 May No 5 199-205 12 charts

By the blood-cultural method described in previous papers the author found that his healthy laboratory guinea-pigs were harbouring bodies indistinguishable from the rickettsiae already grown in blood cultures from patients infected with typhus fever. He mentions that a similar finding had been made in healthy human beings and in most of the animals examined in areas where cases of typhus fever were occurring.

In the present experiments two guinea-pigs inoculated with blood from a typhus patient (*Proteus* OVA titre 1-320) had typical febrile reactions and one of the animals had an orchitic reaction. Two guinea-pigs inoculated with blood from another typhus patient (OVA titre 1-80) had febrile and orchitic reactions.

Other guinea-pigs were inoculated some with their own blood some with blood of another guinea-pig but although the inoculated blood in both sets of experiments had yielded positive cultures of rickettsia the only response was a slight transient rise of temperature on the 11th day. The author concludes that the presence of a latent rickettsial infection does not interfere with the use of the animals for the diagnosis of active rickettsial infection.

John H. D. Megaw

AMBERSON J. M. Typhus in Egypt during World War II *U.S. Nav Med Bull* 1946 Sept v 46 No 9 1482-5

In a brief paper of little more than three pages the author has summarized certain features of louse-borne typhus in Egypt from 1939 to the middle of 1945.

The disease is constantly endemic in Egypt its endemic level is stated to have been 40 cases per 100,000 till 1941 when the epidemic cycle set in with an incidence of 500 per 100,000. The peak incidence was reached in 1943 when the index rose to 229.24 in this year the case fatality rate was 20.2 per cent. In 1944 the incidence was 105.9 and the death rate also fell to 16.85. The figures for 1945 were incomplete at the time of writing but up to June the fatality rate had fallen further to 11.59 so that the epidemic cycle was on the downward grade.

A list is given of the signs, symptoms and complications observed in 196 cases gathered at random. A curious feature of the list is that no mention is made of the common symptoms of fever, headache, and

ng

MCGRAVE A. J. Tests on Clothing Impregnated with DDT as an Anti-Louse Measure *Bull Entom Res* 1946 May v 37 Pt. 1 43-56 [10 refs.]

As a method of testing the toxicity to lice of treated cloth pieces were clipped off impregnated garments and put with lice into gauze-bottomed louse-breeding boxes worn daily on the leg. Observations of mortality among the lice were made after 1, 2 and 4 days and the fabrics assessed as —

Very effective if there was complete kill in 1 day	
Effective	2 days
Moderately effective if there was complete kill in 4 days	
Slightly effective	50 per cent or more in 4 days
Not effective	less than 50 per cent kill in 4 days

Tests were made with various garments (mainly shirts of Angola material), and the results were related to chemical estimations of the DDT content. The garments were distributed as follows:—

Biological assessment	Chemical analysis (per cent. DDT wt/wt)				
	Less than 0.04	0.04-0.08	0.09-0.19	0.2-0.5	More than 0.5
Non effective ...	8	2	1	0	0
Slightly effective ...	2	2	1	0	0
Moderately effective ...	0	1	1	0	0
Effective ...	0	0	3	3	1
Very effective ...	0	0	0	1	2

In another type of test, the lice were allowed to crawl on treated Angola shirting for various periods and then transferred to clean tape. It was concluded that one hour's exposure to 1.75 per cent. impregnated fabric was lethal to all lice in a few hours, while there was a high subsequent mortality after three hours' exposure to 0.1 per cent. DDT. Adult lice were observed to show early signs of poisoning clearly after four to six hours on 0.1 per cent. fabric and after two hours on 1.75 per cent. fabric at 30°C.

Miscellaneous tests showed that DDT is fairly persistent at high temperatures and also that impregnated garments transfer their insecticidal power to paper, or unimpregnated garments, kept in contact with them. It is suggested that the chief loss of insecticidal power is due to loss of impregnated fibres from the surface of the cloth.

J. R. Busvine.

Oz, T. V. Typhus profilaktisinde Kudüs mektebi. [Typhus Immunization: Kudus Method.] *Türkische Ztschr. f. Hyg. u. Exper. Biol.* Ankara. 1943, v. 3, No. 1, 117-20. German summary 121.

At the Kudus Institute in Jerusalem a vaccine of rickettsiae of a murine strain was prepared from male guineapigs. The animals were killed when the scrotal reaction was positive, at the height of fever; the tunica vaginalis was triturated and distributed into 5 Erlenmeyer flasks each containing 4.5 cc. Tyrode solution and 0.5 cc. guineapig serum. This mixture was held at 30°-32°C. for 5 days, then centrifuged, and the sediment mixed with 10 cc. physiological saline containing 0.1 per cent. formaldehyde. The suspension was held in the ice-box for 15 days, and then tested for sterility, harmlessness to guineapigs and antigenicity.

Inoculation of this vaccine in man gives immunity for 6 months to 2 years [the number of injections, and the dose, are not stated in the German summary].

Charles Wilcocks.

LEVINE, H. D. Pathologic Study of Thirty-One Cases of Scrub Typhus Fever with especial reference to the Cardiovascular System. *Amer. Heart. J.* 1946, Mar., v. 31, No. 3, 314-28, 10 figs. [17 refs.]

This is a clear and succinct description of the naked-eye and microscopic changes observed in a post-mortem study of 31 cases of scrub typhus during the year 1944. More than half of the deaths occurred between the 12th and 15th days; the extreme range was 6 to 24 days.

Details of all the chief naked-eye changes are given in tabular form; the microscopic findings are illustrated by 10 photomicrographs which show

pericardial infiltration myocardial necrosis endothelial proliferation and hyperplasia pneumonic infiltration and haemorrhage with focal necrosis in the adrenal cortex

The findings are summed up by the author in the words — The changes described here are quite similar to those found in European (epidemic) typhus

13 of these the muscle fibres were intact in the other 12 there were minor degrees of degeneration Perivascular exudation was a pronounced feature the endothelium of the small vessels in the region of these showed proliferation in many cases

7 cases The lower lobes of the lungs were involved in patches the middle and upper lobes showed focally some degree of inflammatory reaction was found in the lungs in every case but one the reaction consisted of intra alveolar and interstitial exudation of lymphocytes plasma cells and large mononuclear cells in 7 cases the exudate contained polymorphonuclears which were regarded as being due to secondary infection In heavily congested areas the alveolar spaces contained numerous red blood cells

the serous spaces

The author states that from the available evidence it is likely therefore that patients who survive scrub typhus fever ultimately show no residual cardiac damage

Jol : W D Megaw

ENGSTON, Ida A. A Serological Study of 37 Cases of Tsutsugamushi Disease (Scrub Typhus) occurring in Burma and the Philippine Islands *Philippine Health Rep* Wash 1946 June 14 v 61 No 24 897-91 1 fig

The author has already shown that sera of persons or animals infected with known strains of tsutsugamushi rickettsiae when tested by the complement fixation reaction gave much higher titres with antigens of the homologous strain

different stages of the illness were tested

A few examples of the remarkable variations observed in the responses are given below; these have been taken from the Table in the paper, which gives details of the results obtained in each test. The examples given here do not illustrate all the types of response that were observed, as the author states "all possible combinations of K, G, and S, are represented in the results of the tests on the sera of the 37 cases."

	Day of disease	OXK Titre	Complement-Fixation Titre			Type of reaction
			Karp	Gilham	Seeran-Gayee	
Burma series	35	100	2,048	8	2,048	KS
	12	Neg	256	32	2,048	S
	29	100	64	4,096	512	G
	20	800	8,192	1,024	65,536	KS
Philippine 1st series	32	320	8,192	8,192	4,096	KGS
	2nd month	20	16	64	64	KGS
	6th month	20	4	512	Neg.	G
Philippine 2nd series	16	1,280	16,384	32,768	32,768	KGS
	11	20	256	8	4	K

The author points out that "by the use of the K and G antigens antibodies would have been detected in all the sera tested."

In general, considerably higher and more persistent titres were obtained with the complement-fixation test than with the Weil-Felix.

The results do not show any clear differentiation of serological types such as had been suspected to exist

John W. D. Megaw.

BENGTSON, Ida A. Complement Fixation in Tsutsugamushi Disease (Scrub Typhus). *Pub. Health Rep.* Wash. 1946, June 14, v. 61, No. 24, 895-900.

This paper was scheduled for publication on February 11th, 1944, but was withheld because of the subject.

The author describes the preparation of an antigen from the Karp strain of tsutsugamushi rickettsiae. The original strain was received, in the form of frozen specimens of infected chick embryos, from Dr. Lewthwaite of the Federated Malay States. After some preliminary difficulties the strain was found to grow readily in yolk-sac cultures, and the antigen was prepared by a modification of a method found suitable for other rickettsiae of the typhus group.

The antigenic titres obtained were 1-4 to 1-8; these were lower than those of epidemic and endemic rickettsiae, which were 1-16 to 1-64.

Sera of seven guineapigs convalescent from infection with tsutsugamushi rickettsiae yielded complement-fixation titres of 1-16 to 1-64 with the antigen, which was found to be specific as shown by the occurrence of completely negative reactions when it was used in tests of sera which had given strongly positive reactions against their respective homologous antigens in the cases of the following diseases:—epidemic typhus, endemic typhus, undulant fever, Rocky Mountain spotted fever, tularaemia, typhoid fever and syphilis.

In tests of sera of six patients convalescent from tsutsugamushi disease, completely positive reactions were obtained in five cases at titres ranging from 1-32 to 1-2,048; in the sixth case a partial reaction at 1-16 was obtained. In four of the fully-reacting sera, check tests were carried out with antigens of epidemic typhus, endemic typhus, Rocky Mountain spotted fever, and Q fever;

AMERICAN J Hyg 1946 July v 44 No 1 1-5 [29 refs] Q Fever a
Foreword Introduction to a Series of Papers dealing with Q Fever

acts appear in the
apers contain not
their authors but
the disease which hitherto had
where it was first discovered in
had been detected
investigations was information

by the U S Army Medical Department to the D A M C of the Army

American troops

The first systematic investigation of an outbreak was in February 1945 it dealt with the men of a British Parachute Battalion stationed in Italy who were convalescent from attacks of the disease their infection had apparently been contracted in Athens where they had been stationed before their arrival in Italy

From the latter part of February till the end of April of the same year four similar outbreaks among American troops stationed near Florence and Bologna were studied

In February 1945 Dr J Cammopetros of the Pasteur Institute of Greece informed Major Zarafonetis of the U S A Typhus Commission that an outbreak called by the German physicians Balkan grippé had occurred in Athens during the winter of 1943-1944 and that the infecting agent had been transmitted by him to guinea pigs From a sample of blood from one of the infected guinea pigs *Rickettsia burnetii* was later isolated at the Respiratory Diseases Laboratory in the U S A

In August 1945 *R burnetii* was isolated in Panama from a patient whose dis

and that all the known strains of the causal agent *R burnetii* are closely related to each other in their immunological properties though certain antigenic differences have been found to occur
John W D Megaw

Report by F C A RAGAN C A Q Fever in the Mediterranean Area Report of its Occurrence in Allied Troops I Clinical Features of the Disease
1946 J H S 1946 July v 44 No 1 6-22 6 figs [21 refs]

Eight outbreaks of a disease resembling primary atypical pneumonia are said to have occurred in Italy Greece and Corsica during the cold season

months of 1944-45. Five of these were investigated, and in all of them specific antibodies against *R. burneti* were demonstrated; the organism itself was isolated in three of the outbreaks.

The present clinical description is based on observation of the following groups of cases:—

- (1) In a U.S.A. Infantry (53 cases);
- (2) In a U.S.A. Infantry (cases);
- (3) In the 6th Battalion Rome, but quite recently stationed in Athens (40 cases);
- (4) In a U.S.A. Military Laboratory at Naples where work was being done on the rickettsia of the disease (20 cases).

The general clinical picture was—The onset was sudden; commonly with a chilly feeling, sweats, malaise, weakness, frontal headache, and anorexia. Aches in the muscles and pain in the chest sometimes occurred.

A out half of the patients had retro-orbital pain, this was seldom severe. A slight cough often occurred about the 5th or 6th day, sometimes with a little blood-stained sputum.

The fever curve showed great fluctuations, especially when salicylates were given. The fever lasted 4-15 days; termination was by lysis.

In most cases a few crepitant râles, diminished breath sounds, or dullness on percussion, could be detected in localized areas by the 4th or 5th day.

In the British outbreak, splenomegaly and generalized adenopathy were reported to have occurred in about half of the cases; these signs were not present in the other outbreaks.

By X-ray examination patchy areas of consolidation were seen in most of the cases, usually in the lower lobes of the lung.

The attacks varied greatly in severity, but there were no deaths.

Blood cultures, including the Weil-Felix tests, including

R. burneti, using guineapigs with blood taken on the 2nd to the 8th day of the disease. A positive result was obtained in four cases in which there was no evidence of consolidation of the lung.

Sulphonamides and penicillin were useless in the cases in which they were tried.

Notes of six cases, illustrated by temperature charts, are given.

John W. D. Megaw.

ROBBINS, F. C., GAULD, R. L. & WARNER, F. B. Q Fever in the Mediterranean Area: Report of its Occurrence in Allied Troops. II. Epidemiology. *Amer. J. Hyg.* 1946, July, v. 44, No. 1, 23-50, 8 figs. [33 refs.]

Five of the outbreaks of Q fever in the Mediterranean area were investigated from the point of view of epidemiology.

In the first of these, 53 cases of "primary atypical pneumonia" had been diagnosed during February and March 1945, among 156 soldiers who were occupying a requisitioned farmhouse and its ancillary buildings near Florence. The ground floor of the farm house was used for storing grain and sheltering livestock, which included cattle, horses, pigs, sheep, chickens, cats, and dogs. Rats and mice were numerous, and large numbers of pigeons nested in the various buildings.

The incidence was 44-48 per cent. among the men living in attics and hay barns, and 23 per cent. among those living in the first-floor rooms.

R. burneti was isolated from three patients, and the complement-fixation test was positive in sera of 48 out of 53 convalescents.

There was no evidence of person to-person transmission. The probable incubation period was 14 to 26 days.

In the largest of the outbreaks described 269 cases occurred in a unit of about 900 men between April 7 and 29.

The unit was in a camp close to a farmhouse near Florence. A course of intensive training was being carried out. This included cinema demonstrations in the loft of a barn containing old dusty hay on which the men sat. Numerous pigeons nested in holes in the walls and in the nests larval ticks (*Ixodes reflexus*) and rat fleas (*Xenopsylla*) were found.

On the floor of the loft large numbers of tiny mites of various species were found.

The first case appeared 18 days after the unit entered the area. The incubation period was estimated as being 17-23 days. The outbreak was explosive. 63 per cent of the cases occurred in the six days April 10-15.

The various diagnoses made in hospital were: Atypical pneumonia, pneumonitis or primary pneumonia in 24 cases, no final diagnosis in 28 cases, fever of undetermined origin in 24 cases, common respiratory disease in 20 cases, sinusitis in three cases, hepatitis and malaria in two cases each, influenza and meningitis in one case each.

A complete epidemiological enquiry was impracticable. An insect vector was considered unlikely because very few of the men complained of bites. Inhalation of dust infected with dried excreta of rats, mice or pigeons or of insects such as ticks must be considered.

All the other outbreaks were of the same general type. There was usually an association with animals such as pigeons, rats, mice and cattle, also with dust on floors or in hay and straw. It is suggested that mites may have been inhaled with the dust, as is reported in Ceylon where a kind of asthma is said to be caused by inhaled mites [this Bulletin 1945, 42, 73].

The sporadic occurrence of the disease in Italy is mentioned. Sera from 49 isolated cases diagnosed as atypical pneumonia in April 1945 were tested and 29 of these gave positive reactions with the complement fixation test. The patients were stationed in Caserta near Naples.

John H. D. Megaw

ROBBINS T. C. RUSTIGIAN, R. SNYDER M. J. & SMADEL J. E. Q Fever in the Mediterranean Area. Report of its Occurrence in Allied Troops. III. The Etiological Agent. *Immun J Hyg* 1946 July, 44, No 1, 51-63. 1 fig. [20 refs]

The authors isolated 16 strains of *R. burnetii* from 20 patients by injecting 3-5 cc of freshly drawn blood into each of two guinea-pigs. In the successful attempts one or both of the animals became febrile after an incubation period of 3-13 days. In the later passages through guinea-pigs the incubation period ranged from 4 to 8 days.

Apart from fever and enlarged spleen the guinea-pigs showed no sign of infection. No rickettsiae could be detected in smears of the spleen, tunica or other organs. Guinea-pigs inoculated with yolk sac material heavily infected with the organisms became febrile within 24 hours and died in 5-9 days with haemorrhagic pneumonia. Innumerable rickettsiae were found in smears of the spleen and tunica.

Swiss white mice did not react to inoculation. White rats and hamsters were doubtfully susceptible to suspensions of infected guinea-pig spleen but died within 3 days when inoculated with heavy doses of infected yolk sac suspension. Smears of the spleen and tunica showed innumerable rickettsiae. The organisms grew readily in yolk sacs of chick embryos. Ten strains were established from suspensions of spleen of infected guinea-pigs and another from

blood and serum of a human patient. In early passages the embryos died in 8-10 days; after further passages death occurred in 4-6 days.

Infected blood or spleen suspensions of guineapigs were still infective after passage through Mandler porcelain candles, No. 7, 8 and 9.

The complement fixation test was carried out on the lines described by Bengtson; details of the technique are given.

Titres over 1-10 were found to be specific; two of 13 sera from cases of primary atypical pneumonia reacted at 1-10, and two syphilitic sera gave a partial reaction at this titre. In psittacosis, murine typhus, and epidemic typhus the reactions were negative.

A rickettsia-agglutination test was employed to a small extent.

The results of the complement-fixation test were of special interest. When one strain of *R. burneti* isolated in Italy, the "Henzerling strain", was used, the reaction became positive between the 7th and the 13th day in every case of Q fever; the maximum titre was reached about the 21st day; when the American strain (Dyer) was used, the reaction was always negative. So also, serum of the Panama Q fever patient was negative with the American strain, though it reacted at a titre of 1-160 with the Henzerling strain. Sera of a group of guineapigs convalescent from infection were tested, using the same two strains as antigens; up to the 40th day the reaction with the American strain was feeble or negative, with the Henzerling strain it was positive, but between the 40th and 76th day the reactions with both strains became positive at about the same titres.

In further comparative tests five different strains were used, viz., the above two, an Australian strain, and two other strains isolated in Italy; the Henzerling and Australian strains gave similar results, but the other three strains gave much weaker reactions. The differences were found to be quantitative, disappearing when larger quantities of the three feeble antigens were used.

The results suggested that the rickettsiae had two antigenic fractions and that all strains contained considerable quantities of the Henzerling-type in the test, value, ng potency

An interesting finding was that when sera were tested by the rickettsia-agglutination reaction the titres of those that had reacted weakly with the American strain and strongly with the Henzerling strain in the complement-fixation test showed no difference; they agglutinated both types of organisms at similar titres. The authors point out that in the agglutination test the dilutions used are 1-5 or 1-10, whereas in the fixation test they are 1-50 to 1-160.

John W. D. Megaw.

ROBBINS, F. C. & RUSTIGIAN, R. Q Fever in the Mediterranean Area: Report of its Occurrence in Allied Troops. IV. A Laboratory Outbreak. *Amer. J. Hyg.* 1946, July, v. 44, No. 1, 64-71, 1 fig. [10 refs.]

During June, July and August, 1945, 20 proved cases of Q fever occurred among 107 persons employed in a Medical General Laboratory of the U.S.A. Army in Italy. Every one of the six workers in the Virus Section was attacked; three of the four persons working in the adjoining Adjutant's Office were attacked, and six of the 14 workers in the Medical Arts Section, which was separated from the Virus Section by a short internal passage. Among the remaining 83 persons working in the building there were only four cases.

All but one of the patients had either been working with *R. burneti*, or had some association with the Virus Section. Inhalation of air infected with the organism appeared to be the most likely mode of infection.

The outbreak was most closely correlated with work on yolk sac cultures infection in guineapigs had been maintained for 24 months previously without mishap

The virulence of the infection had probably been increased by passage through guineapigs and the high concentration of rickettsiae in chick embryos may have greatly increased the risk of infection

John W D Megaw

FLINSTEIN M YESNER R & MARKS J L Epidemics of Q Fever among Troops returning from Italy in the Spring of 1945 I Clinical Aspects of the Epidemic at Camp Patrick Henry, Virginia *Amer J Hyg* 1946 July 44 No 1 72-87 9 figs [20 refs]

In May 1945 7 500 U S A troops were disembarked at a harbour in Virginia after a nine day voyage from Naples Up to 36 hours after their arrival 62 of the men were admitted to hospital with acute fever It was found that 53 of the patients belonged to the 717th Bomb Squadron whose total strength was 779 Attacks continued to occur till 15 days after arrival and by this time 143 cases had occurred so that 38 per cent of the members of the squadron were affected

ray examina

squadron 31

symptomless cases were found

The early cases were rather severe many of the later attacks were mild or symptomless

The symptoms of the 128 patients who had positive X ray findings were as follows the figures in brackets refer to percentage incidence

The onset was gradual (69.5) or sudden (30.5) Other features were — headache (70) feverishness (73.4) malaise (50) weakness (43.7) chilliness (40.6) backache (24.2) cough (62.5) chest pain not severe (43.9) nasal discharge (23.4) expectoration (26.6) sore throat (14.1) anorexia (36.7) constipation (33.6) nausea (15.6) and pain with stiffness of the neck suggesting the possibility of meningitis (24)

The physical signs observed were — Pharyngeal injection (78.9) nasal congestion (36.7) cervical adenopathy (31.3) fine crepitant rales (41.4) moist rales (14.1) dullness on percussion (32.8)

The maximum temperature was — 102°F or over (37.5) 100 to 101.8° (35.2) 99 to 99.5° (10.9) and 98.5° or less (16.4)

(32.8)

moder
always
Only

lesions

bronchitic when situated at the roots of the lungs peribronchial when they were round the bronchi as in primary atypical pneumonia and alveolar when in the outer third of the lung field in the form of ground glass patches but there was often a combination of two or all three of these

types. The lung lesions disappeared on the average in 10·8 days, but this duration is said probably to be an underestimate.

The routine blood examination yielded little information, except that in early convalescence a slight degree of leucocytosis was often observed.

In the early stages the disease could not be differentiated, except by X-ray examination, from many other acute febrile diseases. The lung lesions differed from those of primary atypical pneumonia in their distribution and character; the infrequency of respiratory symptoms and physical signs were also helpful points.

John W. D. Megaw.

AMERICAN J. HYG. 1946, July, v. 44, No. 1, 88-102, 3 figs. [10 refs.] Epidemics of Q Fever among Troops returning from Italy in the Spring of 1945. II. Epidemiological Studies. By the Commission on Acute Respiratory Diseases [DINGLE, J. H., Director].

This is a study, by the Commission on Acute Respiratory Diseases, of the epidemiological aspects of the outbreak dealt with in the preceding paper, and of other outbreaks of Q fever.

From the 717th Bomb Squadron which left the Grottaglie Air Base near Taranto in Italy on May 13th, 1945, and arrived in the U.S.A. on May 24th, 144 cases were analysed. Between the 18th and 24th of May, 56 cases occurred and further attacks continued to occur in gradually diminishing numbers till the 6th of June.

It was found that four other Bomb Squadrons which had been stationed at Grottaglie at the same time had a similar experience, so that about one-third of the group of 1,638 men were attacked. In 50 per cent. of the cases the onset fell within a period of six days; and allowing for an incubation period ranging from 14 to 26 days it appeared that infection had occurred about the 6th to the 8th of May.

Every possible source of infection was carefully considered, but the great explosive outbreak remained an enigma. The authors were inclined to think that the men had been exposed to the bite of some insect during the time that they were engaged in cleaning the camp area before leaving the base; at this time they were sleeping in the open. Mites or other minute arthropods, whose bites escaped notice, might perhaps have been the vectors; mosquitoes, ticks, and sandflies were not present in large numbers, otherwise their presence would certainly have been detected by the men.

In spite of the large number of opportunities of person-to-person transmission during and after the sea voyage, no case of the disease occurred among contacts coming from uninfected localities.

John W. D. Megaw.

AMERICAN J. HYG. 1946, July, v. 44, No. 1, 103-9. [13 refs.] Epidemics of Q Fever among Troops returning from Italy in the Spring of 1945. III. Etiological Studies. By the Commission on Acute Respiratory Diseases [DINGLE, J. H., Director].

This is an account of an investigation into the aetiology of the outbreak described in the two preceding papers. The causal organism was not isolated, but only four patients with mild attacks at the end of the outbreak were investigated by animal inoculation with blood taken on the 2nd or 3rd day of the illness.

Sera of 112 patients were tested by the complement-fixation reaction during the acute and convalescent stages of their illness, of these 36 showed no rise in titre; 26 showed a two-fold rise, and 50 a four-fold or greater rise.

CHENEY, G & GEIB, W. A. The Identification of Q Fever in Panama. *Amer J Hyg* 1946 July, v 44 No 1 158-72 6 figs [12 refs]

selected cases

In August 1945, a patient who had not been absent from the area for three months was attacked by acute fever. On the third day of the illness each of

on of the infection

John H. D. Megaw

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The average duration of the fever in non-immune guineapigs inoculated with the strains ranged from 3.08 days with the Fort Bragg strain to 4.8 days with the Panama strain.

The antigens, studied by the Bengtson complement-fixation technique, showed great variations in their sensitivity when employed in tests of the sera of infected guineapigs; the Italian and Balkan-grippe strains of antigen were consistently sensitive and gave high-titre responses with sera of guineapigs convalescent from infection with all the strains except the Australian, which, as stated above, did not lend itself to the experiment. Antigens of the American, Fort Bragg, and Panama strains were much less sensitive, and were therefore regarded as unlikely to give good results when used in the complement-fixation tests.

The details of the experiments are fully recorded; they cannot readily be summarized.

John W. D. Megaw.

YELLOW FEVER.

ORENSTEIN, A. J. The History of Yellow Fever and its Present Status. *Pub. Health* Johannesburg. 1946, Sept, v. 10, No. 8, 13-25, 2 charts.

SMITHBURN, K. C. & HADDOW, A. J. Isolation of Yellow Fever Virus from African Mosquitoes. *Amer. J. Trop. Med.* 1946, May, v. 26, No. 3, 261-71, [20 refs.]

This important paper records the isolation of yellow fever virus from *Aedes simpsoni* caught in Western Uganda in a very sparsely populated region where effective mass immunization of the human population had been carried out eleven months previously; and also from mosquitoes caught in the uninhabited Semliki Forest.

Bwamba, a small county in Western Uganda, has been the site of investigations since 1937, when a high incidence of yellow fever immunity was found among the local inhabitants. In this region *Aedes aegypti* occurs, but its behaviour is unusual, for it breeds in tree holes, and the adults are rarely taken whilst biting man: it is scarce in inhabited areas and in huts. There was an outbreak of yellow fever in this locality in 1941 and the virus was isolated from two lots of *Aedes simpsoni*. Subsequent immunity surveys showed that the highest incidence occurred in the regions bordering the main forest, and a high percentage of forest monkeys were found to be immune.

Intensive collection of mosquitoes has been carried on since 1942; the insects were sent to Entebbe for inoculation into laboratory animals (rhesus monkeys and mice). Yellow fever virus was isolated from *Aedes simpsoni* caught at Bundinyama in 1942. Subsequently 48,924 mosquitoes, collected in various parts of the Semliki Forest up to the end of 1943, were examined and three unknown viruses were isolated, but no more cases of yellow fever were found. In April 1944, a mixed lot of *Aedes* mosquitoes from Mongiro, a dense primeval rain forest, was found to contain yellow fever virus; Rift Valley fever virus was isolated from a group of *Eretmopodites* and from another group of *Aedes tarsalis*. The batch of *Aedes* containing yellow fever virus included 80 insects belonging to 12 different species, *Aedes aegypti* and *Aedes simpsoni* not being represented. After April 1944, yellow fever virus was not found, although a total of 35,525 Bwamba mosquitoes were sent to Entebbe for inoculation into animals.

In their discussion the authors consider that the results indicate the presence of an extra-human cycle of yellow fever in the Semliki Forest, and that monkeys

No constant change occurred in the blood picture, in late convalescence the neutrophils in four cases were less than 40 per cent of the total leucocytes

It is stated that 42 other cases of laboratory infection with Q fever have been recorded in Australia the U S A and Italy

John W D Megaw

CHENEY G & GEIB W A The Identification of Q Fever in Panama *Amer J Hyg* 1946 July v 44 No 1 158-72 6 figs [12 refs]

selected cases

In August 1945 a patient who had not been absent from the area for three months was attacked by acute fever. On the third day of the illness each of two guineapigs was inoculated intraperitoneally with 5 cc of his blood, eight days later both animals became febrile and from them a strain of rickettsia was

immune to the Panama strain

The clinical features of the patient's illness were entirely consistent with the diagnosis of Q fever with lung involvement. On the 40th day the complement-fixation test was positive at a titre of 1-512

Complement fixation tests for the fevers of the typhus group were negative during the acute stage of the disease but on the 23rd day a positive reaction for Rocky Mountain spotted fever at a titre of 1-20 was observed

No evidence was found which threw any light on the source or mode of transmission of the infection

John W D Megaw

TOPPING, N H SHEPARD C C & HUENNER, R J Q Fever: an Immunological Comparison of Strains *Amer J Hyg* 1946 July v 44, No 1, 173-82 1 fig [10 refs]

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All the strains grew readily in yolk sac culture and were similar in their morphology. Each strain killed one or more of the lots of chick embryos that were inoculated in the same average time of five days, but the average day of death of all the lots inoculated with each strain varied from 3.9 in the case of the Fort Bragg strain to 5.4 for the Panama strain

Complete cross immunity between five of the strains was demonstrated by guineapig inoculation. the Australian strain could not be tested because it could not be established in guineapigs during the time occupied by experimental work

* The average duration of the fever in non-immune guineapigs inoculated with the strains ranged from 3.08 days with the Fort Bragg strain to 4.8 days with the Panama strain.

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left deltoid region. Light scarification of 0.5 cm in length were made in groups of two. Owing to the mixture of gum arabic with the vaccine, the area had to be covered

group in gum arabic, and the smallpox vaccine then incorporated. For the third group the 17D vaccine was prepared as directed and inoculated subcutaneously.

There were no really significant reactions but a higher proportion of the men in groups A and B had headache, stiffness, ocular and periorbital pains, on the 6th or 7th days.

The men were bled 36-37 days after inoculation. The sera were separated on the following days, each serum divided into two parts, given a code number and one part sent to Dakar and one to Washington to be tested for immune bodies. The original intracerebral mouse protection test of Theiler was used at Dakar. The standard adult mouse intraperitoneal test was used in U.S.A. A comparison of the results showed discrepancies in 92 cases. There was sufficient sera from 86 of these for a further test to be made at Rio de Janeiro by the intracerebral method.

the group of men who received the 17D vaccine. The percentage of positive sera was very similar to that of the groups receiving vaccine from London.

of reasons. The first vaccine consisted of an emulsion.

several French workers who described a considerable number of cases of encephalitis after use of their vaccine.

Since that time it has become increasingly evident that mice may carry latent virus and other infections in their brain which may be pathogenic for man. For these reasons an attempt was made by the workers of the Rockefeller Foundation to obtain an attenuated but living strain which would produce

satisfactory immunity but little or no reaction. Such an attenuated strain, 17D, was obtained after many unsuccessful attempts in tissue cultures, and vaccine has been made on a large scale since 1939 in U.S.A., South America and England, by inoculation of developing chick embryos with this strain of virus.

Its immunizing capacity has been amply tested in the field in South America and demonstrable neutralizing antibodies have been found in 96 per cent. of a group of individuals four years after inoculation. The present test also showed that 97-100 per cent. of the inoculated individuals had neutralizing antibody in their blood. The main drawback to the use of this vaccine is its marked instability at temperatures above 5°C., especially when the virus is in solution. It was interesting to note that although the 17D vaccine contained nearly five times as many mouse lethal doses of virus as the Dakar vaccine, it produced demonstrable immune bodies in the serum, as measured by the intracerebral protection test, in a much smaller percentage of individuals.

The potency of the dried Dakar vaccine is said to persist for two months after leaving the laboratory, provided it is kept in an ice-box. The vaccine may be transported at "ordinary" temperatures, if for not more than a few days. Its stability is thus about the same as the dried 17D vaccine. Though the Dakar vaccine produces a greater degree of immunity as measured by serum antibody, the fact that the 17D vaccine does produce serological neutralizing antibody in the sera of 97-100 per cent. of recipients with no chance of extraneous infection (as far as known at present) or encephalitis, the latter vaccine appears to be the more suitable for use. There is no doubt that it would be much more satisfactory to have an inactivated virus, and it is possible that with some of the newer methods of concentrating virus and exposure to a process such as ultra-violet radiation, a stable, innocuous and satisfactory antigen may be achieved.]

F. O. MacCallum.

BRAZZAVILLE [A. E. F.]: RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR EN 1944 [CECCALDI, J., Director]. 49-53. Fièvre jaune. [Yellow Fever.]

The Pasteur Institute at Brazzaville continued to use the yellow fever vaccine containing 17D virus from the Rockefeller Foundation in 1944/45. Batches of vaccine were found to have retained their potency after two to three years' storage at temperatures of 5°C. to 10°C.

A reaction, on the sixth day after injection, was observed in only one of the 710 individuals who received the yellow fever vaccine.

Mouse protection tests on sera from various regions showed positive sera from 11 years; from 1 of 14 adults and 5 of 1 youngest was 13 years old.

A small experiment with 15 mice suggested that penicillin might have slight virucidal action on neurotropic yellow fever virus *in vitro* [see also LINHARES, this *Bulletin*, 1945, v. 42, 373.]

F. O. MacCallum.

MACCHIAVELLO A. Plague Control with DDT and "1080" Results achieved in a Plague Epidemic at Tumbes, Peru, 1945 *Amer J Pub Health* 1946 Aug 1 36 No 8 842-54 1 graph & 1 plan

Plague is an excellent example of a disease which involves several factors several links in a chain of events before it appears in epidemic form. An attack may be made on one or more of these links upon the rodent reservoir and the insect vector or better still on both of these. This article is specially directed to the use of the pulicide DDT and the raticide sodium fluoracetate (1080). It reinforces its argument and its conclusion that the application of DDT followed by poisoning with 1080 promises to be the procedure of choice in the control of epidemics of bubonic plague by taking as example an epidemic in the city of Tumbes Peru. The campaign was successful for the epidemic was stopped 4 days after finishing the first application of DDT. That was a remarkable result for a city the capital of a Department with 10 000 inhabitants which had no sewers no public water system which was liable to flooding in the rains so that the houses of bamboo wood and mud

although it is probable there were some unrecorded cases of plague toward the

mosquitoes. Mention is made of the toxicity of 10 per cent DDT for rats and dosages of 1.0 to 2.0 gm of the and as a secondary poison of the blood of poisoned rats. This will be dealt with later. In the application of 1080 as raticide the city was divided into 9 sectors and the poisoned baits—cakes rolled oats or water—were placed in all likely situations. The baits of rolled oats were made up in doses of 3 or 4 gm poisoned with 1080 in the proportion of 5 parts of poison per 1 000. Care had to be taken to keep the baits out of reach of children and domestic animals. No accidents occurred to human beings but a few cats were killed. Many other details are given of the use of this double and direct measure in which both pulicide and raticide have been almost the only agents in a successful plague campaign. R. F. Harney

GOLCH H. H. DDT to control Rat Fleas *J Econom Entom* 1946 June 1 39 No 3 410-11

successfully used
The fleas killed
as *fasciatus* and
on down each rat

hole.
The following ingenious control method was also employed. Cylinders of roofing paper 12 in long and 3 in in diameter were prepared. The DDT was applied to strips of cheese cloth which were then folded and suspended from the

roof of each cylinder. The cylinders were then thrust into rat holes so that rats running in and out dusted themselves with DDT. In practice, however, this method was found no better than simple dusting. J. R. Busvine.

CHOLERA.

WOODWARD, L. K. Condition simulating Appendicitis following Cholera Vaccine Inoculation. *U.S. Nav. Med. Bull.* 1946, Sept., v. 46, No. 9, 1377-8.

This paper presents an interesting and somewhat disturbing object-lesson, in differential diagnosis between a medical condition and one requiring surgical intervention.

Cholera vaccine (8,000 million per cc.) was administered subcutaneously to 1,100 men in a U.S.N. ship, in two doses of 0.5 cc. and 1.0 cc., with eight days interval.

From 2 to 5 days later, 38 men developed clinical manifestations very closely resembling appendicitis, localized pain and tenderness being prominent. These features persisted for 3 to 16 days, with an average of 7. In the vast majority of cases, the leucocyte count was about 10,000 or more per cmm., though no unusual change in the differential count was noted. Other examinations revealed no significant information.

The condition developed after the first inoculation in 20 cases, and after the second in 18. The clinical features were not exaggerated by a second inoculation in those who showed them after the first (although the second dose was withheld from about one-third of the men).

In 3 cases the appendix was removed. Two patients showed only slight inflammation of the appendix, whilst the third had marked infection and oedema. All three had a striking mesenteric lymphadenitis. Histopathological facilities were not available.

The fact that two of the men had had previous appendicectomy suggested some other aetiological factor. Since then, the author's experience has been confirmed by similar results seen by his colleagues elsewhere. In one instance, nearly all the men receiving cholera inoculations developed a moderate to severe diarrhoea, of some days' duration, a few days later.

The author concludes, with considerable evidence to support him, that the conditions described resulted from the cholera inoculation.

[This is an important observation in the interests of medical officers who are encountering the practice of anti-cholera inoculation for the first time, since the deceptive clinical features might readily lead to a diagnostic error, having serious implications.]

H. J. O'D. Burke-Gaffney.

BACILLARY DYSENTERY.

THOMPSON, C. M. & WHITE, B. V., Jr. Shigellosis Studies. III. Clinical Observations on Dysentery caused by *Shigella flexneri* III. *U.S. Nav. Med. Bull.* 1946, June, v. 46, No. 6, 901-10.

A considerable epidemic of bacillary dysentery occurred in September 1945 among naval units in Tokyo Bay, some 1,300 persons being affected at the height of the outbreak, without, however, any reported deaths; men in shore installations appeared to be free from the disease.

was studied in detail, *Shigella flexners* III was isolated. The illness was acute, with chill fever of followed after some hours by watery re was an atypical coryzal onset, with In both types the acute febrile onset was misleading the abdominal tenderness with muscular spasm in the abdominal wall in some cases simulated appendicitis while the acute febrile onset with coryzal symptoms suggested the onset of an acute catarrhal fever

developed diarrhoea which in later stages was associated with weight loss

was a scanty mucous exudate in the early stages there was a secondary infection of the bowel wall. Finally the exudate became mucoid or muco-purulent and the mucous membrane oedematous with a cobble stone appearance representing the stage of indolent repair. Most of the patients remained on the sick list for about 19 days but the duration of the disease was very variable. The first sign of improvement was the return of appetite followed by a lessened frequency of diarrhoea and a gradual increase in weight.

known to be susceptible to sulpha drugs as the strain was used it failed to influence the tenacity of the infection. The basis of treatment was therefore maintenance of protein and electrolytic balance, with rest for the affected bowel by means of a liquid diet supplemented by intravenous saline dextrose plasma and whole blood. Diarrhoea cramps and spasms were treated with bismuth opium and warmth. After the acute diarrhoea had subsided rectal lavage with warm physiological saline solution seemed to hasten recovery and reduce proctospasm.

In view of the influenza like onset of many of the cases and the occasional appearance of herpes the authors wonder whether a virus may have been associated with the *Shigella* organism as a contributing or predisposing aetiological agent. Epidemiological studies suggested that the disease was spread chiefly by food handlers.

F. Murgatroyd

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

HARGREAVES W. H. *Amoebiasis Practitioner* 1946 Aug v 157 No 938
93-100 2 figs on pls [17 refs]

This general account of amoebiasis is written for practitioners of medicine in Britain in view of the wholesale infection of troops and others overseas during the late war. It is orthodox and adequately comprehensive but contains nothing original.

A. R. D. Adams

HAYWARD, G. W. Amoebiasis in Italy. *Brit. Med. J.* 1946, Sept. 28, 457-9.

The clinical picture of amoebiasis in Italy is different from that seen in India and Burma. The more obvious dysenteric symptoms are usually absent, and

204 (81 per cent.) of the 252 patients, and in 70 was evident on the patients' admission; 106 (42 per cent.) gave a history of abdominal discomfort or upset; and it was usual, on close questioning, to obtain a history of other more vague manifestations of ill-health. Thickening or tenderness of the caecum was present in 63 per cent.; 70 per cent. showed idoscopy; and all the cases were specifically of vegetative *E. histolytica* in the stools. The difficult until a system of vigorous purgation by magnesium sulphate at 7 and 9 o'clock ti repeated stool examinations was adopted. was the infrequency with which amoebic cysts were found in the stools—5 per cent. of the cases only."

With the standard M.E.F. course (injections of emetine grain 1 and Quinoxyl 2½ per cent. enemata daily for 10 days; Carbarsone 0.25 gm. twice daily for 8 days; and then E.B.I. grains 3 for 12 days) or the C.M.F. course (emetine grain 1 daily for 3 days; E.B.I. grains 3 concurrently with Quinoxyl 2½ per cent. enemata for 10-12 days; and then Carbarsone 0.25 gm. twice daily for 8 days) "the depressing results from standard courses of treatment reported from India and Burma have not been experienced in Italy." Only two cases were determined to have positive stools three weeks after treatment; but although a proper follow-up of all cases was not possible, nine were known later to relapse.

After some observations on the need for thorough treatment to eradicate an *E. histolytica* gut infection the author refers to the difficulties in the diagnosis of amoebic hepatitis, of which he saw six examples in his series of cases. The picture was here complicated by the fact that an attack of infective hepatitis may leave a permanently enlarged liver. He concludes with the observation of:

of
fiable to institute a long and unpleasant course of treatment in amoebic 'carriers', where the only positive finding is the presence of cysts of *E. histolytica* in the stools," but it has been the author's practice to treat such infections.

[On the evidence presented there seems to the reviewer no real reason to believe that the amoebiasis described by the author in Italy substantially differs in its course and response to treatment from that found elsewhere. The fundamental difference between these particular cases and those very severe cases encountered in India and Burma, some but not all of which have proved difficult to treat, would appear to lie in the conditions under which the infection was acquired and treated. One series, the Italian, occurred under reasonably good conditions of life, the other occurred under the conditions obtaining in jungle warfare—with all that entails in lowered resistance, concurrent infections, and lack of early hospitalization facilities. The apparent paucity of cyst-formation in these Italian cases needs substantiation before acceptance, as it is at variance with the usual findings in Italy and elsewhere.]

A. R. D. Adams.

TALLANT, E. J. & MAISEL, A. L., with technical assistance of M. Ruth RAKESTRAW. Amebiasis among the American Armed Forces in the Middle East. *Arch Intern Med* 1946 June 17, No 6, 597-613 [Refs in footnotes]

The authors give an account of their experience with amoebiasis in an American army hospital in the Middle East during the two year period November 1942 to November 1944. Among patients admitted 464 were diagnosed as amoebiasis but only a small percentage of these were suffering from dysentery. About 58 per cent had loose stools or diarrhoea and about 41 per cent normal stools at the time of admission. Of the acute amoebic cases only 18.1 per cent had dysenteric stools. It was found that 22 per cent of the Native soldiers consisting of the two years second year by the end of which they were detected in 36.4 per cent. Of cases examined sigmoidoscopically 10.1 per cent of patients with acute amoebiasis, 10.2 per cent of those with chronic amoebiasis and 7.5 per cent of carriers had an apparently normal intestinal wall. Of the appendicectomies carried out during the period amoebic involvement of the appendix was detected in 3.2 per cent. Treatment was carried out with various combinations of intramuscular emetine, carbarsone, diodoquin and chinofon. In most cases a cure was obtained but some proved resistant. In some it was difficult to decide whether relapse or reinfection had occurred.

C. M. Wenson

" R. An Analytical Study of Intestinal Reference to Amoebiasis. *Indian Med* 6/7 230-34

In the decade 1925-1934 9,015 patients suffering from various complaints were admitted to the hospital attached to the Calcutta School of Tropical

aged over sixty years. Of the 176 patients with amoebiasis 51 per cent

Various treatments were employed for amoebiasis and the drugs used included emetine parenterally, I. B. I., Kurchi liquid extract, K. B. I. tabloid, Kurchi and Stovarsol orally, Yatren by mouth and as a retention enema.

4876 (an arsenical) and Carbarsone orally. The "results indicated that most of the drugs used singly are on the whole weak amoebicides. The best results were obtained with Carbarsone," the failure rate being only 9 per cent. with this drug when used alone.

A. R. D. Adams.

HOPKINS, D. L. & WARNER, Kay L. Functional Cytology of *Entamoeba histolytica*. *J. Parasitology*. 1946, Apr., v. 32, No. 2, 175-89, 4 figs. [29 refs.]

In this paper the authors describe the results of their study of the cytology of *Entamoeba histolytica* in its relationship to locomotion and pseudopodium formation, ingestion and digestion of food and the excretion and egestion of waste products. It is shown that *E. histolytica* thrives best at a redox potential below that which is required to reduce neutral red to colourless form (about $-0.4V$). Greater reduction than this is associated with encystment, while greater oxidation is injurious and is associated with degeneration. Food is ingested at a point just anterior to the posterior end. action of enzymes which are carried to the food

which arise at the periphery of the nucleus. The movements of the amoeba are the result of a cycle of changes as in *Amoeba proteus*, in which there is a change from gel to sol posteriorly and from sol to gel anteriorly. The liquid plasmagel is forced forwards by contraction of the outer layers of gel. It passes or bursts through the anterior gel and forms a hyaline cap beneath the plasmalemma. In this way, pseudopodia are formed. It is of interest that the authors find that the various changes which take place at $37^{\circ}C$. do so equally well at ordinary laboratory temperature of about $24^{\circ}C$., but occur more slowly, there being no indication that the behaviour was abnormal at the lower temperatures.

Other subjects discussed include the chromatoid bodies, osmotic activity of cytoplasmic inclusions and the failure of vital dyes to help in the study. The paper, which is illustrated by a series of text figures, must be studied in detail by those interested in the physiology of *E. histolytica*. C. M. Wenyon.

SHIH LU CHANG. Studies on *Entamoeba histolytica*. IV. The Relation of Oxidation-Reduction Potentials to the Growth, Encystation and Excystation of *Entamoeba histolytica* in Culture. *Parasitology*. 1946, Jan., v. 37, Nos. 1/2, 101-12, 1 fig. & 9 graphs.

In previous papers [this *Bulletin*, 1943, v. 40, 310, and 1944, v. 41, 217] the author has given an account of his studies on the effect of hydrogen-ion concentration on the process of encystation of *E. histolytica* in culture and the importance of the bacterial flora in maintaining a pH range favourable for encystation and multiplication of the amoebae. In the present paper are described the results of observations on the oxidation-reduction potential in cultures, and the influence this has on the biological activities of the amoebae. The somewhat complicated technique for carrying out the observations, and the apparatus employed, are fully described with the aid of a diagram, while the results are illustrated in a series of graphs.

It was found that the best growth of trophozoites occurred at potentials between -350 and -425 mV, and that with a rising potential there was a decreasing multiplication till it ceased between -50 and -150 mV. Trophozoites died after an exposure of 12 hours to potentials between -50 and $+50$ mV; they died and disintegrated in two hours between potentials $+100$ and $+200$ mV. It was also noted that the longer the potential remained below -150 mV the longer did the culture remain positive, and it was only at this potential or lower that excystation would occur. Mass encystation occurred

if after a period of active multiplication of the amoebae during 22-24 hours there followed a sharp rise of potential. If immediately after the sharp rise there was a fall in potential the cysts failed to become mature and disappeared in about 12 hours. Following rapid multiplication of amoebae at very low potentials smaller amoebae and cysts were produced than when less rapid multiplication and encystment occurred at higher potentials. In certain cases

was 7.2 or higher. It appears that to encyst they will not do so change of potential from one condition are supplied by the bacterial flora but it is hoped that a means may be found of providing them without the help of bacteria. C. M. Weyson

VON BRAND T, REES C W, REARDON LUCY V & SIMPSON W F. Chemical Studies on Egg-White Medium for the Cultivation of *Endamoeba histolytica*. *J Parasitology* 1946 Apr; 32 No 2 190-96 2 figs

stances in relation to the quantity of overlay and the length and temperature

tively large amounts of reducing substances essentially glucose and of nitrogenous materials essentially ovomucoid diffuse from the egg white base into the overlay but that very little ether soluble material does so. It was found that the diffusion of of the nitrogenous material varied with the length of stay that for comparative studies been stored for the same length of time and at the same temperature. It is felt that the data given in the paper may be of use in the standardization of media for the culture of *E. histolytica*. C. M. Weyson

HITCHCOCK Dorothy J & RAWSON G W. The Use of Dehydrated, Coagulated Egg Yolk in the Preparation of a Medium for culturing *Endamoeba histolytica*. *J Parasitology* 1946 Apr; 32 No 2 170-74 1 fig

The authors describe the preparation of liquid media from dehydrated

The quantity of egg The final medium was strain of *E. histolytica* single bacterial organism inoculated. The other best containing medium The growth was correlated sixteen sub-cultures C. M. Weyson

SIRTORI, C. & ZORZOLI, G. Le false amebe dell'intestino e della vescica. ["False" Amoebae in the Intestine and Bladder.] *Boll. Istituto Sieroterap. Milanese*. 1945, Jan.-June, v. 24, 85-106, 11 figs. on 7 pls. [18 refs.]

In this illustrated article the authors draw attention to the frequent presence in faeces and urine of false amoebae which may give rise to erroneous diagnosis of *E. histolytica*. In faeces these appear in cases of colitis and after repeated purging with salines or phenolphthalein, while in urine they occur in cases of cystitis and after administration of urotropin. The false amoebae are not derived, as usually claimed, from macrophages but from epithelial cells which have undergone various types of degeneration. The swollen nuclei of these cells with their vacuoles and nucleoli stained by bile pigments may appear like amoebae with ingested red blood corpuscles. In no case should a diagnosis of *E. histolytica* be made unless the characteristic nucleus can be seen quite distinctly.

C. M. Wenyon.

ANDREW, R. The Clinical and Pathological Features of the Dysenteries. *Med. J. Australia*. 1946, Aug. 31, v. 2, No. 9, 289-311, 5 figs. [27 refs.]

This Stowell Prize Essay for 1945 contains a good general account of the classical bacillary, protozoal and helminthic dysenteries, with a description of some illustrative cases seen by the author among Australian troops in the Middle East, New Guinea and Australia. It contains no original contribution to the subject.

A. R. D. Adams.

✓ CANAAN, T. Hepatic Complications of Amoebiasis. *J. Palestine Arab Med Ass.* 1946, Sept., v. 1, No. 6, 161-71. [29 refs.]

Intestinal amoebiasis has long been known to be common in the coastal plains of Palestine. The author found 27.5 per cent. of 550 persons to harbour *E. histolytica*. Less than one-third of the 152 infected persons had active intestinal symptoms attributable to the infection at the time of examination. Of 520 other unselected patients examined for liver enlargement or tenderness, 78 per cent. gave a history of dysentery or of diarrhoea; 46 of the 520 had liver enlargement, and in 18 of these the liver enlargement was thought by the author possibly to be attributable to amoebiasis, although in only two of these 18 cases did the liver diminish in size after emetine injections; one of these two had a concurrent cholecystitis, which was relieved by the emetine therapy. Analysis of yet another 300 unselected cases submitted to X-ray examination showed that 66 had some liver enlargement; the author discusses the causes of this enlargement, and considers that in no case was it attributable to hepatic amoebiasis. He found, from hospital records in Jerusalem and Bethlehem, that the incidence of amoebic hepatitis and amoebic liver abscess in Palestinian Arabs, during a twelve-year period, was very low (0.265 per cent. of all inpatients, and 0.96 per cent. of those found to harbour *E. histolytica*) in spite of their high rate of intestinal infestation.

A. R. D. Adams.

ROSE, J. R. Vaginitis due to *Entamoeba histolytica*. [Correspondence.] *Lancet*. 1946, Apr. 6, 520.

The two cases described from Fatshan, S. China, are of purulent vaginitis with ulceration of the vaginal wall. In both cases, active amoebae with

ed red blood corpuscles were present in all specimens of the pus examined : of the cases in a woman aged 60 there was a mild amoebic dysentery. Cysts alone could be found in the stools. In the other case in a woman of 41, the bowel condition was normal. The first case was cured by emetine.

H. S. A Copper Sulphate Flotation Method for the Examination of *Entamoeba histolytica* Cysts. *Indian Med Gaz* 1945 Dec. v. 80 No 12 619-21

The method described involves the use of a copper sulphate solution of 1000 mg per 100 ml.

The slide is slightly raised at the same time and a cover glass is placed over it. The method of preparation of the copper sulphate solution is somewhat involved but when this has been prepared the technique appears very simple. C. M. Henyon

PEN. A. T. H. The Detection of the Cysts of *Entamoeba histolytica* in the Faeces by Microscopic Examination. *Med J Australia* 1946 June 29 1, No 26 915-16

Asymptomatic patients have no signs of infection and the matter of infection remains in doubt. Cysts are

one cyst from a patient passing 1000 cysts a day, 220 stools must be examined. There is therefore no practicable way of detecting all chronic infections by stool examination or of detecting more than a minority of those individual patients voiding 10 000 or less cysts a day. The significance of negative findings on examination of a predetermined number of stools under varying conditions of time of place and of degrees of intensity of infection therefore be appreciated. While the detection of every affected individual

was determined from each of 1015 patients clinically cured of amoebic dysentery, but one-third of these men were found still to pass cysts. In the author's

The author emphasizes the danger of over-confidence in ability to diagnose amoebic dysentery from the appearance of the lesions without recourse to the microscope

Prognosis depends upon the extent to which the infection has progressed and upon the treatment to which the patient has been subjected. Upon these grounds the following table has been constructed

Lesions observed after treatment	No of cases	No of relapses	Per centages
Inflammation	76	6	7.9
Ulceration and/or submucosal haemorrhage	24	13	54.17
Stricture	2	2	100
Normal mucosa	198	28	14.14

A study of this table reveals no absolute correlation between the sigmoidoscopic appearances and the relapse rate. It would appear that within a period of 21 days relapse is almost as likely to occur in those showing normal post-treatment sigmoidoscopic appearances as in those with definite pathological changes. In amoebic stricture the infection cannot be eliminated by a single course. In 24 cases there were too short to

W. H. Manson Bahr

CROPPER C. F. J. Sigmoidoscopy in Amoebic Dysentery [Correspondence] *Lancet* 1946 Sept 28 473

This letter is a postscript to a previous article by the author [this *Bulletin* 1946 Vol 43 39] who revises two points as the result of recent experience

— had for producing a clear
At the end of 4-6 hours
all or not all traces of the
I have been almost invariably eliminated or absorbed

minute as to appear as if by a small group either single or scattered are best examined with a special magnifying attachment (shown to the author by Lt Col A. M. KHAN R.A.M.C.) with which actual tissue loss may be detected

H. J. O. D. Burke Gaffney

JACOBY H. A New Amoebicide for Chronic Amoebic Dysentery *Indian Physician* 1946 Aug Vol 5 No 8 187-9

Amesaniol Maltex is a quinovyl compound 8-hydroxyquinoline 5-sulphonate of soda containing approximately 28 per cent iodine. It is non-toxic and does

not irritate the tissues. The standard dose was 45 tablets [strength not stated] within seven days. No other treatment was given to 30 patients with chronic amoebic infection. The results of the trials were fully successful in those who had had previous treatment, as well as in those who had not. All stools, with one exception, became negative after one course of treatment; the cases were followed up for two to three months.

Amesaul Maltex therefore appears to be the best of the oxyquinoline group of drugs, especially in chronic cases. Encouraged by these results the author also tried the drug in three cases of acute bacillary dysentery, in which, also, it was successful.

P. Manson-Bahr.

BULL. U.S. ARMY MED. DEPT. 1946, Sept., v. 6, No. 3, 259-62. Survey of Intestinal Parasites in Soldiers being separated from Service. [Tropical Disease Control and Laboratories Branches, Office of the Surgeon General, Washington.]

A survey was made at the 4th Service Command Medical Laboratory, Fort McPherson, Ga., on the stools of 4,000 servicemen returned from the tropics. These consisted of 2,760 white and 1,240 Negro soldiers. Allowance is made for the fact that most of these men resided in the south-eastern States before their army service, but it is considered that they serve roughly as adequate controls, compared with those who had not served overseas.

The figures given represent the results of a single stool examination from each man. Orthodox methods of preparing, staining and examining the specimens were employed. Stoll counts were carried out when hookworm eggs were found. Hookworm egg counts varied from less than 100 per gm. to 17,800. In the majority of cases (262), the egg counts were between 100 and 5,000 per gm.

The most prominent findings among the 4,000 examinations were —

<i>E. histolytica</i>	.. ..	14.3 per cent.
<i>E. coli</i>	... ..	17.9 ..
<i>E. nana</i>	.. ..	26.4 ..
<i>I. bütschlii</i>	. . . .	3.1
<i>G. intestinalis</i>	.. . .	4.8
Hookworms	... ..	11.6 ..

The other common parasites were each under 1 per cent.

The following three tables are of comparative interest.

Incidence of parasitic infection in soldiers with service only in the United States and those with service overseas.

	Number of men examined	Infected with 1 or more parasites	Infected with <i>E. histolytica</i>	Infected with hookworm
		Per cent.	Per cent	Per cent.
Service in continental U.S. only	1,273	58.6	10.1	7.5
Service overseas	2,727	51.6	16.3	13.5
Total	4,000	53.9	14.3	11.6

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

BALTAZARD M Identification des spirochètes récurrents—individualité de l'espèce *Spirochaeta recurrentis* [Differentiation of Relapsing Fever Spirochaetes—Individuality of the Species *Treponema recurrentis*] Arch Inst d'Hessarek Teheran 1946 May No 4 57-62

The author has shown that *Spirochaeta recurrentis* is not the same as other spirochaetes. It is highly virulent in mice, but not in guinea-pigs. Following charcoal treatment, it infects lice feeding on human cases, but it is infective for monkeys. It is not a constant parasite of the blood.

isolated during a large epidemic in Iran. Attempts were made to increase the duration and weight of infection in mice by splenectomy before inoculation and by rapid passage, but all proved relatively unsuccessful.

A definite difference in microscopical appearance between *T. recurrentis* and tick-borne relapsing fever spirochaetes was observed with dark ground illumination. This is vital.

and he
ain of
borne
spirochaetes J C Broom

RAFII A *Spirochaeta microti* n. sp. parasite du campagnol (*Microtus* sp.) en Iran [*Spirochaeta microti* n. sp. a Parasite of Wild Mice (*Microtus* sp.) in Iran] Arch Inst d'Hessarek Teheran 1946 May No 4 49-51

A new species of spirochaete for which the name *Spirochaeta* [*Treponema*] *microti* is proposed by the author has been isolated from wild mice in Iran. This organism, unlike *T. persicum*, will not infect rabbits and guinea-pigs, but is highly virulent for white rats. J C Broom

QUIN C E & PERKINS E S Tick-borne Relapsing Fever in East Africa J Trop Med & Hyg 1946 Apr-May v 49 No 2 30-32

An account of the clinical features and results of N A B therapy based on observations made on 400 African troops suffering from tick fever in East Africa. The bulk of the cases occurred in transit camps infected with *Ornithodoros*.

monia 5, severe bronchitis 4 per cent. In doses up to 0.6 gm. this therapy seemed to have little effect on the course of the disease for the same average of two relapses occurred in these 80 patients treated with N A B and in 49 controls receiving only symptomatic treatment. E Hindle

RAYNAUD, R. & PÉGULLO, J. Méningo-encéphalite et typhus récurrent. [Meningo-encephalitis and Relapsing Fever.] *Algérie Méd.* 1946, May-June, No. 3, 241-2.

This is a report of a case of an Algerian native showing a meningo-encephalitic syndrome, which lasted for five days and was followed by evidence of an extra-pyramidal lesion which still persisted after five and a half months.

On the fifth day, *T. recurrentis* was found in a blood film. Six days later, the temperature rose again and was accompanied by a recrudescence of the meningeal syndrome, with treponemata in the cerebrospinal fluid.

To begin with the Wassermann and colloidal benzoin reactions were strongly positive, but when the meningeal manifestations resolved, the Wassermann reaction became negative and the colloidal benzoin test normal.

The author comments on the transitory positive Wassermann and colloidal benzoin reactions whilst the meningeal syndrome persisted and which were "contemporary with the spirochaetal septicaemia".

He also comments on the occurrence of "relapsing fever syndromes, the organism of relapsing fever beside the neurotropic viruses".

H. J. O'D. Burke-Gaffney.

RAYNAUD, R. & PÉGULLO, J. Manifestations d'un typhus récurrent comme les seuls signes de la maladie. *Paris.* 1946, Nos. 22/23, 368-70, 1 chart.

FLOCH, H., TAILLEFER-GRIMALDI, J. & DE LAJUDIE, P. Sur la leptospirose ictéro-hémorragique à Cayenne [Icterohaemorrhagic Leptospirosis in Cayenne.] *Institut Pasteur de la Guyane et du Territoire de l'Inini.* Publication No. 129. 1946, June, 9 pp., 4 charts (1 folding).

During the last quarter of 1945 and the first quarter of 1946, the authors diagnosed 4 cases of Weil's disease among the patients of the General Hospital at Cayenne.

The cases were all identified by sero-diagnostic tests, these were positive against *L. icterohaemorrhagiae*, but negative against *L. grippo-typhosa*. The clinical symptoms are described in detail and present the usual variations found in this disease.

The main interest of these cases lies in the possibility of their being confused with yellow fever. The authors are of the opinion that some of the cases of jaundice with "black vomit" that have been notified from time to time as suspected cases of yellow fever, were in reality cases of spirochaetal jaundice.

E. Hindle.

BUCHANAN, G. Spirochaetal Jaundice (Weil's Disease). Does it occur in South Africa? *South African Med. J.* 1946, Sept. 14, v. 20, No. 17, 507.

"No evidence of spirochaetal jaundice was demonstrated in over 200 jaundiced patients investigated.

"No rats and other rodents examined were found to harbour the causal spirochaete.

"The leptospirae present in local slummy waters produced no ill-effects in guineapigs."

the ten years there have been six births at the San Luis de Jagua and 19 at San Lazaro 25 in all 15 boys and 10 girls 15 white eight half-castes and two negroes In June 1945

few months of birth

sent is greatly needed and

relatives of the patients

The number of lepers registered as dying in the decade 1936-45 was 535 This includes those who died in hospital or in their own homes Nearly half 250 were between 31 and 50 years of age four were under 15 163 were between 51 and 70 and 40 were over 70 401 were males 134 were females

H Harold Scott

HELMINTHIASIS

DE OLIVEIRA P P Helminthiase e anemia no meio militar [Helminthiasis and Anaemia in a Military Establishment] *Rev Brasileira Med* Rio de Janeiro 1945 Oct v 2 No 10 835-9 English summary

The faeces of 445 men in an artillery regiment were examined by the Stoll method for helminthic infestation and 441 (99.1 per cent) were positive *Ascaris lumbricoides* was present in 425 (94.6 per cent) *Trichuris trichiura* in 336 (74.8) *Necator americanus* in 323 (71.9) *Strongyloides stercoralis* in 27

ntage figures except the last

and phenolphthalein and L Q B E vermifuge (Laboratorio Quimico Farmaceutica do Exército) which contains essence of chenopodium 2 drops chloroform 1 drop podophyllin and phenolphthalein [amount not stated] The

treatment and gentian violet (merexylan Wander) was substituted 0.06 gm tal uts 3 daily for 20 days subsequent examination of faeces failed to discover any ova

1 or the anaemia 4 preparations were tried the sulphate and chloride of iron with copper sulphate and with vitamin B It was found that ferrous sulphate was the best especially in the form of the Army laboratory anti anaemia

ferrous sulphate 0.20 gm

best was Ribotiron which

H Harold Scott

STICKARD H W Interrelationships and Taxonomy of the Digenetic Trematodes *Biol Reviews* 1946 Oct v 21 No 4 148-58 [Numerous refs]

PINTO C & DE ALMEIDA A F Distribuição geográfica e frequência do *Schistosoma mansoni* no Brasil [Geographical Distribution of *Schistosoma mansoni* in Brazil] *Rev Brasileira Med* Rio de Janeiro 1945 Dec v 2 No 12 1000-1008 28 refs English summary

This article is based on the many recorded findings of medical men all over Brazil who have examined the faeces of the people or who by viscerotome

specimens have found evidence of schistosomiasis. It is impossible to give the names of all the places where the infestation has been found, for the article itself is little more than a list. Suffice it to say that the infestation is very widespread. In the State of Pernambuco there are as many as 65 foci, in Bahia 37, in Minas Geraes 33, in Alagoas 20, in Paraíba 11 and in Sergipe 10; in several other States foci exist, but in fewer places. So far 198 foci have been found.
H. Harold Scott.

MACFARLANE, Dorothy G. & MACY, R. W. *Cercaria oregonensis*, n. sp., a Dermatitis-producing Schistosome Cercaria from the Pacific Northwest. *J. Parasitology*. 1946, June, v. 32, No. 3, 281-5, 1 fig.

The authors investigated in 1943 and 1945 the cause of the severe dermatitis occurring in a man after swimming in the lake in the campus of Reed College, in the Portland area of Oregon. The dermatitis was ascribed to a new species of cercaria which is described. For the details of the structure of this species the paper itself must be consulted. The only local snails that were found infected with it belonged to the species *Physa ampullacea* (Gould).

This addition to the species of cercaria which can cause dermatitis of man may be confused with *Cercaria elvae*, but it is not likely to be confused with the other species known to cause this disease. After leaving the snail *C. oregonensis* swims to the lightest part of the container; it may remain motionless in the light area of the container, but usually it attaches itself to the side of the container by its ventral sucker. *C. oregonensis* emerges from the snail between 6 p.m. and midnight, while *C. elvae* emerges in the late afternoon. The authors found only mature sporocysts and found them only in the late autumn. Like those of other cercariae of this group they were interwoven with the tissues of the snail and could not be dissected out. Probably there are mother and daughter sporocysts similar to those of *C. stagnicolae* described by CORT and OLIVIER (*J. Parasitology*, 1943, v. 29, 81).

The dermatitis closely resembled the swimmer's itch common in the North Central United States and in Canada. Attempts to produce it experimentally, by putting the foot or arm into a bucket containing very numerous cercariae, failed; but when several drops of water containing numerous cercariae were placed on the forearms of six persons, the dermatitis was produced in two of these subjects. As the water evaporated the cercariae seemed to penetrate the skin. Intense itching or prickling resulted, which lasted 3 hours. The infected spot was at first red and during the next two days papules appeared and there was discomfort when the skin was irritated by the sleeve, but pustules did not develop. The dermatitis lasted a week in one subject and a month in the other.
G. Lapage.

KHALIL, M. B. & HILMY, I. S. The Palm-Leave as a Snail Trap; a Preliminary Report. *J. Roy. Egyptian Med. Ass.* 1946, Jan.-Feb., v. 29, Nos. 1/2, 1-6.

In order effectively to assess the results of anti-bilharzia campaigns, it is necessary to be in a position to determine quantitatively the intensity of snail infestation in water-courses before and after eradication measures have been attempted.

The authors describe a snail-trap by means of which, it is claimed, the presence of snails and the degree of infestation of a given water collection may be determined with ease and fair accuracy.

The trap consists of a piece of fresh, green and intact palm-branch of constant length (one metre is suggested). The trap is submerged horizontally in the water, and anchored to the bank by a length of string attached, at its other end, to the centre of the branch.

The tip of the branch should point down stream and the upper surface of the leaves opposite to the canal bed (It is suggested that the whole trap including the string should be well under the surface to escape the notice of passers by, who are apt to take possession of the string)

After four days the trap is raised carefully and the snails are collected by placing the palm branch vertically tip downwards in a white dish of water. Each leaf is scraped gently to release any snails found on it. The hands should be rinsed in a jug of water from time to time. The authors claim that it is possible to a great extent to avoid infection with *Schistosoma cercariae* by using rubber gloves are not necessary at all (nevertheless the gloves may easily be improvised from a sheet of paper which may fall out of the sheet dish and the net are washed in the net are washed in the cleaned sheet or dish and the snails thrown back into the water [Presumably to maintain snail population for comparison])

When all the leaves in a water jug are poured into a wire net the canal and then sorted and counted on the cleaned sheet or dish and the snails thrown back into the water

The authors state that the trap has been used for 16 years and that snails were collected in large canals where the wire net method failed. It was used successfully along the course of the Nile in the Assuan Dam and in the canals before the Korn Ombo campaign in 1940.

Two tables are presented to show the varying sizes of trap periods of immersion in water and types of snails caught which increased with the period of immersion. The second table also compares traps used in pairs at either side of a canal.

The authors state It is significant to note that the total number of snails on either trap of each experimental station is almost equal for equally large traps though the number of the corresponding group of snails varies greatly. They consider however that this variation does not affect very much the predominant snail present in the canal should there be one. [The value of the tables is lessened by the fact that the unit of measurement of the traps is not indicated in them]

H J O D Burke Gaffney

WELLER T H & DAMMIN G J An Improved Method of Examination of Feces for the Diagnosis of Intestinal Schistosomiasis *Amer J Clin Path* 1945 Nov 15 No 11 496-500

This paper describes studies on a method of improving the efficiency of the acid-ether centrifugation technique as used for the recovery of eggs of *Schistosoma mansoni* [see also this *Bulletin* 1946 13 347]. The point at issue was the liberation of eggs which are trapped in the stratum of floating debris between the acid and the ether and which therefore fail to reach the egg bearing sediment after centrifugation. It was thought that the addition of a wetting agent could reduce the adhesive properties of the debris and thus release the eggs containing relatively large numbers of eggs.

was much increased. Triton NE (a 33 per cent aqueous solution of phenyl ether) further studies were carried out to determine the degree of increased efficiency and also the mechanism. It was proved that the increased

efficiency was due, in part at least, to the release of eggs trapped in the debris. The effectiveness of the routine method, and of the Triton NE modification, were compared when used under survey conditions. Duplicate samples from 500 faecal specimens were examined by the two techniques. By the routine method eggs of *S. mansoni* were recovered from 84 of the specimens; by the Triton NE modification 105 specimens were positive. J. J. C. Buckley.

HALAWANI, A., NOR-EL-DIN, G., SHAKER, M. & KHALEK, F. A. On the Value of the Colloidal Gold Reaction and Cephalin Cholesterol Flocculation Test in the Study of Liver Damage in Cases of Schistosomiasis. *J. Roy. Egyptian Med. Ass.* 1946, Jan.-Feb., v. 29, Nos. 1/2, 7-12. [11 refs.]

The authors begin their paper by discussing the results and significance of the colloidal gold reaction and the cephalin cholesterol flocculation test, and they review the literature, with special reference to the cephalin cholesterol test and its mechanism.

They then describe their experiments, designed to assess the value of these two tests in detecting liver damage caused by bilharzial infection and antimony treatment. They chose patients with long-standing infections of intestinal schistosomiasis associated with liver changes and splenomegaly. Urinary schistosomiasis was also studied, and, for comparative purposes, cases of infective hepatitis, obstructive jaundice, malaria and amoebic hepatitis were included.

The flocculation test was done on 135 sera, and the colloidal gold test on 87. For the latter test, McLAGAN's method was used, and for the former, HANGER's.

Some 85 per cent. of cases of intestinal schistosomiasis were positive by both tests. The cephalin test was found the more sensitive of the two. The authors consider the tests of value in jaundice and cirrhosis and hope to publish results of tests performed before and after treatment of schistosomiasis. The principal results are summarized below:—

Condition	Cephalin flocculation test			Colloidal gold test		
	No of sera	Positive	No. ++ or above	No. of sera	Positive	No. ++ or above
Apparently free from liver damage ...	8	5	0	10	1	0
Bilharzial cirrhosis ...	13	11	9	20	17	15
Infective hepatitis ...	32	31	28	65	60	55
Malaria and dysentery ...	3	3	3	11	11	11
Obstructive jaundice ...	6	1	1	7	2	1

H. J. O.D. Burke-Gaffney.

RADNA, R. Contribution au traitement de la bilharziose intestinale. [The Treatment of Chronic Intestinal Schistosomiasis.] *Ann. Soc. Belge de Méd. Trop.* 1946, June 30, v. 26, Nos. 1/2, 87-8.

Although intestinal schistosomiasis usually responds successfully to chemotherapy, a few cases are left with a refractory proctitis, ulcerative or papillomatous.

The author has treated six of such cases with intramuscular injections of histidine, having been impressed by the results of this treatment in other forms of chronic ulceration of the stomach and intestines.

The preparation used was Larostidine Roche. A complete course consisted of 10 ampoules [quantity not stated] being

ESPERSEN, T. Om tilsigtet og uopsket Virkning ved 191 Baendelormekure med Extractum filicis i Doser paa indtil 15 gram. [Results of treating 191 Cases of Tapeworm Infection with *Extractum filicis*] *Nordisk Med* 1916 Sept 27 & 31 No 39 2191-5 [12 refs] English summary

18. " " Copenhagen between 1890 and 1915. Out of 12 were *Taenia solium* to *T. solium*. No evidence of pilularis was seen. The dose used was *Extractum filicis* in the last 25 years it was given in doses up to 15 gm but since 1933 the maximum dose was reduced to 10 gm.

In 72 per cent of cases evacuation of the scolex occurred after the first treatment the frequency of this was some 8 per cent greater when 12-15 gm was used than with a dose of 8-10 gm.

"In a few cases such toxic phenomena as palpitation tachycardia feeling of cardiac oppression and accelerated menstrual bleeding occurred. Severe jaundice and in two

cases of 12-15 gm were observed. In two cases of 10 gm but these may have been not always observed. No threatening signs of intoxication otherwise appeared.

Vomiting diarrhoea and abdominal discomfort did not seem to have a convincing relation to the size of the dose but general lassitude was rather more common after large doses.

"Of the patients were children in them, the outcome of the cure was

the other tables show the results, of different dosages
H J O D Burke Gaffney

LORSTER, E B. Insanity with Epilepsy following Infestation by *Cysticercus cellulosae* [Memoranda] *Brit Med J* 1948 Oct 12 513

DUNGLAL N. Echinococcosis in Iceland. *Amer J Med Sci* 1946 July, 212, No 1, 12 17, 1 fig 10 refs

Table 2 given by the author shows that these cysts were present mostly in those belonging to the higher age groups. None was found in persons under the age of 20 years. Among 93 subjects aged over 70 years cysts were found in 20, and in 151 over 60 years old cysts were found in 41 (16 per cent.), a proportion of 1 in 6. Dungal concludes that in 1913 every sixth person harboured hydatid cysts.

The author regards these figures as being representative of the whole country, because, although they are taken from hospitals in Reykjavik, most of the people of that city were brought up in the country and patients in its hospitals come from other parts of Iceland. A graph of the number of subjects of hydatid disease reported in Iceland between 1896 and 1940 and of the deaths due to this disease since 1911 indicates that in 1940 the number was only one-tenth of that in 1912.

Probably at the end of the last century a third or even half of the people of Iceland had the infestation. This is not surprising in view of the fact that they lived closely with dogs, and knew little about the method of infestation. KRABBE (*Recherches helminthologiques en Danemark et en Islande*, Copenhagen, 1866) found *Echinococcus granulosus* in 28 per cent. of Icelandic dogs, which is an infestation rate 47 times higher than that found in Denmark; and there were, in Iceland, 15,000 to 20,000 dogs at a time when there were 70,000 people. FINSEN reported that in 1858 it was rarely possible to slaughter an old ewe or cow without finding an echinococcus cyst.

There is, however, little doubt that the younger generation now growing up is practically free from the infestation. The author's autopsy records show this. The cysts are found only in the older people. The decrease is due to education of the people and to anthelmintic treatment of the dogs once a year, which has led also to the disappearance of *Coenurus cerebralis* and other kinds of tapeworm cysts of sheep communicated to them by dogs. These were found in every flock during the last century. Formerly sheep were kept until they were 3 to 4 years old before they were killed; they then contained hydatid cysts old enough to have developed daughter scolices. Now they are killed at the age of 5 months. Further, during the last 3 decades, the rural population has moved into the towns and villages and one-third of the whole population lives in Reykjavik.

HARTZ, P. H. Human Strongyloidiasis with Internal Autoinfection. *Arch. Pathology*. 1946, June, v. 41, No. 6, 601-11, 11 figs.

The author describes the infestation of an adult Negro with *Strongyloides stercoralis*. Autopsy was done 40 minutes after death. He gives a detailed description of the histological changes seen. These cannot be summarized in detail here, but the author emphasizes the almost complete absence of ulceration of the intestinal wall. Only a few microscopic ulcers were seen and these were probably due to the presence of larvae of the nematode in the mucosa. The invasion of the intestinal wall by the larvae was quite independent of this ulceration. In the duodenal wall adult *Strongyloides* were not numerous. Those that were present were found in the stroma of the villi, in the intervillar spaces and rarely in the depths of the crypts of Lieberkühn. The adult nematodes were never surrounded by epithelial sheaths and, although a moderate number of eosinophil cells was present, the eosinophilia was not pronounced. Eggs and the earlier larval phases of the nematode were present only in the epithelium of the crypts of Lieberkühn and villi, never

in the stroma. Often they were present in groups and were completely surrounded by epithelial cells but there was no desquamation of epithelium as the author considers that the desquamation described by STRONG (*St. Diagnosis Prevention and Treatment of Tropical Diseases* 7th Edn 1936 p. 1278) was due to post mortem change. Hartz thinks that the eggs and larvae probably stimulate the proliferation of the epithelial cells so that incubation chambers are formed around them. He cannot agree with TALST (*Arch. Pathology* 1935 v. 19: 769) that this is a defensive reaction by the host. He thinks on the contrary that the epithelial proliferation protects the eggs and larvae. Older larvae had migrated from the epithelium to the crypt of Lieberkuhn or to the lumen of the duodenum and were present in great numbers in the lumen; they were never surrounded by epithelial sheath but epithelial cells were drawn out and thinned over some of the older migrated larvae. In many places there was marked inflammation in the crypts or at the tips of the villi rarely combined with fibrinoid necrosis of the tips of the villi. When inflammation of the deeper parts of the duodenal mucosa was present

against nematodes may be partly absent.

In the colon the surface epithelium was practically intact and only a few microscopic ulcers were seen. The larvae here were mostly transformed in filariform larvae and had invaded the gut wall by entering the lumina of the crypts of Lieberkuhn from which they had penetrated the mucosa. Probably these larvae came from the small intestine because this is the only site in which large numbers of eggs are found. Superficially the mucosa here contained dermal infiltrations with plasma cells and eosinophils. In the deeper layers of the part of the alimentary canal many larvae were often present and there were moderate numbers of giant cells and nematodes surrounded by histiocytes present in small abscesses or without any reaction around them, the eosinophils being few in this region. The submucosal lymphatics of the colon were

In the connective tissue of the submucosa of the colon there were a few intact larvae but most of them were damaged and had provoked severe reaction. The author emphasizes the formation around many of them of eosinophilic granulomas composed of eosinophils and mononuclear cells.

When the larvae were very numerous eosinophilic granulomas were formed. Larvae had also penetrated into the muscular coat and subserous connective tissue and the intramuscular connective tissue septa. Eosinophilic granulomatous tissue being formed around these also. There were many granulomas in the subserosa, the mesocolon and mesosigmoid and also the liver around filariform larvae which were present either just below the capsule of the liver or deep in its tissue.

The author draws attention to the dilatation of the lymphatics and the presence in them of a granulomatous lymphangitis caused by larvae present in their lumina which led to the encapsulation of the larvae and to more or less complete obliteration of the lumen with consequent peripheral dilatation. In contrast to filarial lymphangitis in which oval and more elongated cells predominate (HARTZ this *Bulletin* 1944 v. 41: 955) the cells more frequently present in the lymphangitis of strongyloidiasis are large rounded and

vacuolated histiocytes; later, the contrast between these two conditions is less marked, but nematodes were always present in the granulomas of strongyloidiasis observed in this patient.

The changes observed in the walls of the bowel and in the lymphatics could cause marked functional disturbances, but the subject described was not observed clinically for these. Invasion of the larvae by leucocytes was seen only occasionally, but when the larvae are disintegrating it may occur. [Cf. VINNITZKY, this *Bulletin*, 1945, v. 42, 746.]

G. Lapage.

HENRARD, C., PEEL, E. & WANSON, M. Quelques localisations de *Wuchereria bancrofti* Cobbold au Congo Belge. Cycle de développement chez *Culex fatigans* Wied, *Anopheles funestus* Giles, *Aedes aegypti* Linnacus et *Anopheles gambiae* Giles. [Occurrence of *W. bancrofti* in the Belgian Congo; Development in Mosquitoes.] *Rec. Travaux Sci. Méd. Congo Belge*. 1946, May, No. 5, 212-32. [16 refs.]

The authors publish observations on *W. bancrofti*, both in mosquitoes and man in the Belgian Congo.

The larvae of several nematodes occur in human blood in this region. *W. bancrofti* is not rare, in certain particular localities, and the majority of those infected show no lesions attributable to the parasites in eighty-seven hydroceles the blood and the hydrocele fluid were negative. On the entomological side it is shown that *Anopheles funestus* is easily infected in the laboratory, completely so in ten days (temperature not stated). Individual *A. funestus* infected in nature are not rare in houses, and this insect is the normal carrier. The evidence about *A. gambiae* is less full, but indicates that it is probably equally infectable. In *Aedes aegypti* (contrary to what has been recorded elsewhere) the worm can go through its cycle and reach the labium. It seems that this takes longer in this mosquito than in *A. funestus* and that there is a delayed development of some of the worms. In *Culex fatigans* only a small proportion of larvae go through to the stage found in the labium, and the period in the mosquito seems still more prolonged. This insect is a poor vector, in the Congo.

P. A. Buxton.

GUYANE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR DE LA GUYANE FRANÇAISE ET DU TERRITOIRE DE L'ININI PENDANT L'ANNÉE 1945 [FLOCH, H., Director]. (Publication No. 125. 1946. Cayenne) pp. 90-99 [20 refs] Filariose à *W. bancrofti*. [Filariasis associated with *W. bancrofti*]

Records of the prevalence of *Mf. bancrofti* in the blood of residents in Cayenne have varied greatly. THÉZÉ in 1916 found 37 among 103 examined, and three with embryos of *F. demarquay*; TISSEUIL in 1934 found 24 per cent. positive [number examined not stated] and a year later 12 per cent. among hospital patients, and 18.6 per cent. of 240 examined at the institute of Hygiene. In Martinique, Noc and STÉVENEL reported 5.47 per cent, Low 32.8 per cent. in St. Kitts, FLU 3-60 per cent. in Dutch Guiana according to social standing; at Belem, Brazil, CAUSEY *et al.* reported in 1945 that 10 per cent. of 5,000 persons examined were carriers of *W. bancrofti*.

In 1944-45 in Cayenne the blood of 683 persons was examined by smear and by thick drop between the hours of 3 and 10. Of the totals 430 were Creoles and the remaining 253 included Senegalese, Arabs, Asiatics and Europeans; of the Creoles 320 were males, 110 were females; 12.1 per cent of the former and 18.1 per cent. of the latter were positive. The ages of highest infestation

Several species of mosquitoes were ex-
the sole vector in French Guiana 11 per
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hantiasis and *W. bancrofti* infestation was
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such a crisis and ten elephantiasis puer-
immunity it is said disappears rapidly after the crisis but the organism remains
latent until it again gives rise to another crisis. The case is cited of a woman
who in 1939 started to have attacks of lymphangitis which necessitated her
keeping in bed for as long as a fortnight. These attacks occurred practically
every month at first and later they became more frequent. Various forms of
treatment had been tried but ineffectually until she was given a vaccine
of lymphangitic streptococcal. After 10 injections the crises ceased and

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as a separate affection

H. Harold Scott

PRATT I & NEWTON W. L. The Migration of Infective Larvae of *Wuchereria*
bancrofti within the Mosquito Host and their Rate of Escape under
Laboratory Conditions. *J. Parasitology*, 1946 June, 32 No 3 272-80

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with the taking of blood meals by the mosquito they qu- work of
several authors which indicates that about two weeks must pass while the

larvae are in the mosquito before they become infective, and that they then pass first to the abdomen and from there migrate through the thorax to the head and proboscis and that the infective larvae may emerge apart from blood meals, either when pressure or heat is applied or when the mosquito feeds upon sugar solution.

The authors themselves allowed *Culex quinquefasciatus* [*C. fatigans*] to feed at night upon a subject infested with the periodic strain of *W. bancrofti*. Three lots of mosquitoes were used, each lot containing about 75 to 100 females; and three separate feeds were allowed. The females were allowed access to the subject's arm between 11 p.m. and 5 a.m. Examination of the finger-tip blood between 11 and 12 p.m. usually showed 20 to 30 microfilarial larvae per 20 cm. of blood. The gorged mosquitoes were put in cages at a temperature of 74° to 80°F. and a relative humidity of 75 to 85 per cent., and were supplied with sugar solution on cotton pads. Earlier experiments had shown that the larvae usually reach the infective stage at the end of 16½ days under these conditions. At the end of this 16½-day period and at intervals, of 2 days until 30½ days, and again after 39½ days, the mosquitoes were killed and the proboscis, head, thorax and abdomen were dissected separately; the infective larvae were counted in each of these parts of the mosquitoes. The earlier dissections revealed many larvae in the thorax, which had not reached the infective stage, and, when these were normal and motile, they were counted as potential infective larvae. Table 1 shows the results of the dissection of 209 mosquitoes.

we r mosquito at the different intervals
 day vs; 30.0 at 20½ days; 20.2 at 22½
 and 1.5 a 10.2 at 28½ days; 8.8 at 30½ days
 between was from

the mosquitoes by the proboscis (see below). The loss was not statistically significant until after 18½ days. There was considerable variation in the number of larvae found in the different mosquitoes, and the authors explain this difference by experimental factors which they could not control; they could not determine, for example, the relation between the time of the feeds taken from the subject and the maximum concentration of microfilariae in the subject's blood, and there is some evidence that individual larvae need variable times to become infective or migratory, some of them requiring longer than 16½ days and some becoming infective before that time. Statistical analysis showed, however, that the average numbers given by the authors were stable.

The figures given of the average numbers of larvae found in the different parts of the mosquitoes indicate that at 16½ days there was considerable migration from the thoracic muscles to the abdomen. Two days later, the thorax was still losing larvae, but the larvae were also leaving the abdomen for the head and proboscis. This process went on for 4 days or longer; but, although the thorax and abdomen were losing larvae fairly rapidly during this time, the head and proboscis were not gaining them after 18½ days. The authors conclude that, after 18½ days, the larvae were probably escaping from the proboscis. The reasons for this conclusion are discussed. Among them is the authors' observation that larvae did emerge when the anterior end of the proboscis was immersed in saline without any other stimulus, and that spontaneous emergence often occurred when the proboscis contained five larvae or more. Eight or ten larvae would emerge within a minute. The authors also found evidence of the rupture of the proboscis, and the larvae were never seen to emerge from any other part of the body. No larvae were found on the cotton pads soaked in sugar solution, on which the mosquitoes were fed, but the authors concluded

that they escaped while the mosquitoes fed on this solution or when the proboscis was ruptured because it was too tightly packed with larvae

The figures also show that there was a continued rapid migration of larvae from the thorax and abdomen to the proboscis after 18½ days

Most of the larvae had left the mosquitoes by 24½ days and those that were left at that time seemed to migrate back and forth from the abdomen to the head a few occasionally leaving the proboscis but so few larvae were then present that accurate conclusions on this point could not be drawn

Under natural conditions loss of larvae can be expected during the week after they reach the infective stage

G. Lapage

WHARTON, D. R. A. Transplantation of Adult Filarial Worms, *Litomosoides carinii* in Cotton Rats. *Science* 1946 July 12 30-31

Pointing out that the experimental study of filariasis is handicapped by the prolonged period required for the development of the adult in the definitive

uninfected cotton rats

The infected cotton rats were anaesthetized with ether the thorax was shaved and the body was swabbed with a solution of phenol the thoracic area being washed with alcohol. A slit was made with scissors along the anterior midline and continued along the sternum up to the clavicle. The sides were pinned down to expose the pleural cavities and the nematodes were withdrawn from these aseptically with forceps or better with a hooked rod. They were then placed in sterile saline. The rat into which they were to be transplanted was anaesthetized with ether shaved and swabbed and then the central area of the right anterior thorax was punctured with a thin blade the opening being kept open with blunt hooks to make possible the insertion with the aid of a blunt probe of 5 to 25 specimens of *L. carinii*.

Attempts to transplant this species of nematode into 10 normal cotton rats have so far failed. As early as three days after the transplantation the nematodes are dead and are accumulated in a single mass which becomes a syncytium of degenerating worms. Living microfilariae may however be found for a week or longer in the pleural cavity and in the blood. There was no gross exudation of fluid into the pleural cavity which appeared to be healthy the syncytium of worms being cleanly isolated in a serous covering.

Successful transplantation was however accomplished into splenectomized cotton rats the reticulo-endothelial system of these latter having previously been blocked with Indian ink. Variable numbers of living *L. carinii* were recovered from the pleural cavity of 4 out of 9 rats used and there were indications that the nematodes in one other rat had lived long enough to migrate from the right to the left pleural cavity. The males often survived effects of the defence mechanism of the host which killed the females. The exudations of the females seemed to be more irritating than those of the males. Nematodes transplanted into one side of the thorax were later found in approximately equal numbers in the pleural cavities of both sides and can migrate across the mediastinum through the fatty tissues or between the parietal pleura and the diaphragm. The author found the nematodes in these tissues.

Successful transplantation into two out of three rats has also been accomplished after these rats had been treated by X irradiation with 140 kV 5 M.A. (with out filters) at 25 cm using a large cone (over 7 cm) and delivering

120 r. per minute." The type of cell and tissue most affected by this treatment, as contrasted with that of blockade, offers significant data about the resistance of the host.

Successful transplantation has also been effected from one naturally infected rat to another naturally infected one. Also rats injected four or five times during as many weeks with a suspension of *Dirofilaria immitis* in a mixture of Falba, mineral oil and killed tubercle bacilli [see FREUND and BONANTO, *Bulletin of Hygiene*, 1945, v. 20, 162] have "accommodated transplants" of living specimens of *L. carinii* and in one of them "lymph node invasion" was observed. More details of the pathological observations will be published later. SCOTT and CROSS (*J. Parasitology*, 1945, v. 31, Supp., 15) noted in old cotton rats tumours in the superior mediastinum which were, they assumed, caused by the dead adult filarial nematodes. Wharton has also "not infrequently" observed tumours which are the result of the death of the nematodes while they are in transit through the fatty lymphoid tissue in the superior mediastinum near the hilum of the lung. He considers that this is accidental. A characteristic feature of the infection is, however, a generalized or spotty proliferative reaction of the visceral and parietal pleura, which culminates in papillary nodulations on its surface. Neither the nematodes nor the nodules invade the lung proper, although the lung shows a reaction to the infection. The spleen is hypertrophied. G. Lapage.

FRANKS, M. B. Blood Agglutination in Filariasis. *Proc. Soc. Exper. Biol. & Med.* 1946, May, v. 62, No. 1, 17-18

FRANKS, CHENOWETH and STOLL (*Amer. J. Trop. Med.*, 1946, in the press) have studied, on Okinawa island, the frequency distribution of the A, B blood groups. The blood group percentages of 1,000 persons (about 5 per cent. of the population) were compared with the frequency distribution of the A, B blood groups of 180 persons from the same villages whose circulating blood contained microfilariae. The number of microfilariae was determined by dilution counts. A table shows that the incidence of filariaemia is greater among persons whose sera contain no natural antibody to group A red cells. The results are shown below—

TABLE I
Frequencies of the A, B Blood Groups in Persons with Microfilaraemia compared with the Systematic variations in the Frequencies of the Blood Groups on Okinawa.

Percentage in 1,000 Okinawans* Percentage in 180 persons with filariæmia †Statistical significance of differences	A	AB	O	B
	40.8 52.0 Significant	8.3 10.3 Not significant	31.8 25.9 Possibly significant	19.1 11.8 Significant

* Comdr. Fink has since done 500 additional typings from these villages without any appreciable change in percentages given here
† The odds against the occurrence of the differences in the ratios arising by chance alone are approximately 40 to 1 for A, 1 to 1 for AB, 10 to 1 for O, and 140 to 1 for B.

The author remarks that the data here given are not sufficient to determine the immunological significance of the presence of isoagglutinins in five sera from filarial patients, and that there is at present no support for the attractive hypothesis that the agglutinin is produced as a result of stimulation by a

States Thus STRONG (Still's *Diagnosis Prevention and Treatment of Tropical Diseases* 1943 6th edn p 1298) reports that in 1919 in Charleston S.C. 77 (nearly 20 per cent) of 400 subjects examined had circulating microfilariae in their blood and that cases of filariasis had been found as far north as Washington D.C.

The general conclusion of the authors is that skin tests done with *D. immitis* antigen are doubtless a valuable aid to diagnosis and may be highly specific
G. Lapage

MADSEN H. *Biological Observations upon Enterobius vermicularis* (Pinworm)
Reprinted from *Acta Path et Microb Scandinavica* 1945 v 22 No 4
392-7 {21 refs}

The author discusses his reasons for concluding that infestation with *Enterobius vermicularis* occurs most often by inhalation of the embryonated eggs rather than by contamination of the finger nails and communication of the eggs to the mouth [see also SCHUFFNER this Bulletin 1946 v 43 233]

by the gravid uterus so that the female is forced to release her hold on the

himself obtained from the lower part of the colon by means of enemata plenty

from the rectum more often did so. Eggs taken from females which had emerged spontaneously on the other hand practically never failed to hatch. The author concludes that the maturation of the eggs rather than any mechanical factor determines the migration out of the anus. He claims that this view is confirmed by the observations of LEUCKART (*Die menschlichen Parasiten* 1876 2 Bd I IV pp 1-882) that females spontaneously emerging from the rectum are always found in the caecum.

Madsen and COTTELL (this Bulletin) examined the perianal skin and found it empty or almost empty of eggs and concluded that the female can move out of the anus and in again in order to lay the eggs in batches and that the males can also wander in and out in this way. The periodicity of this emergence is often monthly and the author suggests that it is so because of the periodicity of development of the parasite. This view is supported by the author's own observations on *Enterobius* and is more likely than the view that development of the nematode larval phases takes place in the intestinal tract of the host especially in the caecum. ZAWADOWSKY and SCHALIMOW (*Ztschr f Parasitenk* 1930 v 2 12) showed that the eggs of *E. vermicularis* must have reached the tadpole stage before they can develop outside the host and that they then require oxygen. Further the eggs are

regularly laid " in the anus " and not in the intestine of the host and are not mature until the nematodes are leaving the intestine. Even the eggs which may, as MADSEN (*Bibl. Laeger.*, 1941, No. 5, p. 113) showed, have been found in the intestinal wall and could there obtain oxygen from the host's blood, never developed to the tadpole stage. This hypothesis of the development of the nematode in the host's intestine is contrary to our knowledge of the development of nematodes related to *Enterobius*, and should be abandoned for ever.

G. Lapage.

BIJLMER, J. An Exceptional Case of Oxyuriasis of the Intestinal Wall. *J. Parasitology*. 1946, Aug., v. 32, No. 4, 339-66, 11 figs. [20 refs.]

Bijlmer makes a unique contribution to the literature of oxyuriasis by describing a remarkable case of invasion of the intestinal wall, particularly of the rectum, colon and ileum, by thousands of immature *Enterobius vermicularis*.

The patient, a man of 46 years of age, suffered for the last six months of his life from diarrhoea. This grew so violent that on admission to hospital he was already moribund and was passing from 10 to 12 watery stools, with blood, daily. Bacteriological and serological tests were negative. At post mortem there was gangrenous ulceration in the rectum, colon and ileum. The sub-mucosa and subserosa were penetrated by numerous oxyurids. The worms were spread evenly throughout the intestinal wall but in places they were aggregated in large numbers. In an 11 cm. square of rectum there were more than 650 immature worms, of which about 200 were lying transmurally. The total number of worms present in the intestinal wall alone was estimated at over 10,000. The proportion of males to females averaged 5 to 1 in the colon and 6 to 1 in the rectum. All were very small. The males averaged $1,550\mu$, the females from $1,200\mu$ to $2,325\mu$, none contained eggs.

Evidence was obtained that the worms pass into lymph vessels and even into large blood vessels.

Bijlmer is of opinion that the ulcers, which had undermined edges, were invaded secondarily and were not primarily caused by the worms. There was no noticeable inflammation in the neighbourhood of the parasites.

The contents of this communication have already appeared in 1944 in Dutch (*Nederl. Tijdschr. v. Geneesk.*, 1944, Jan. 8, v. 88, Nos. 1/2, 24) in substantially the same form with ten figures. The additional figure accompanying the present paper illustrates the male spicule.

R. T. Leiper.

WIRD, K. A Trichinosis Epidemic in the Borås District, its Clinical and Epidemiological Aspects. *Acta Med. Scandinavica*. 1946, Oct. 15, v. 126, No. 1, 1-16. [Numerous refs.]

Trichiniasis is a relatively rare disease in Sweden. In some years no case is seen, in others half a dozen or so; larger outbreaks have occurred in 1917 (18 cases), in 1937 (about 50 cases), in 1944 in the Alingsås district (13 cases), and in October of the same year the one recorded in this paper, 37 cases in Sparsör, 6 kilometres from Borås. The cases were typical as regards signs and symptoms; nearly all had facial swelling, with nausea, vomiting, diarrhoea, fever, headache and eosinophilia.

Investigation revealed that all had eaten pork from one ham-and-beef shop, the proprietor of which obtained all his pork from one source, a butcher who supplied all the shops in Borås once a week. Nine farmers supplied him with pigs and the infested pig was traced to one of these; but how this pig became infested remained an unsolved problem.

found it to range from 13 to 39 days usually 18-23 and SYLLA in 1942 in 117 cases found it to range between 8 and 30 days. In general the more severe the case the shorter is the incubation period. It is not always easy to determine the earliest symptom as the onset may be vague but in the majority (35 out of the 37 in this outbreak) oedema of the eyelids is the first sign noticed. Leucocytosis ranged between 10 000 and 29 000 per cmm and eosinophilia from 6 to 72 per cent but as others have also found there is no relation between the degree of eosinophilia and severity of the disease in fact in the very severe it may be low. Faecal examinations were made for the worm and blood examinations for the larval forms but none was positive. Skin tests with *Trichinella* antigen were positive in 25 out of 34 patients but were negative in some with typical clinical symptoms. Fouadin is said to be beneficial in treatment but none was obtainable those patients with fever were given sulphathiazole but without benefit.

Seven to 8 months later 24 persons returned for re-examination four still had slight muscular discomfort and ready fatigue none of the others had any complaint. None had eosinophilia above 4 per cent and one who had had 72 per cent now had only 1 per cent.

Another case occurred in the same district 9 months later. It was quite typical and the infested pig was traced the incubation period in this case was 16 days.

H. Harold Scott

ROTH H. Employment of Serological and Skin Tests at Outbreaks of Trichinosis in the Alingsås and Eorås Districts (Sweden). *Acta Med Scandinavica* 1946 Oct 15 v 126 No 1 17-33 1 fig. [Numerous ref.]

Serological and skin tests are of greater value for diagnosis than the more direct methods of looking for worms in the faeces or for larvae in the blood stream or in muscle biopsy. The immunological tests mentioned by the author are five in number — (1) Bachman's intradermal test [see this *Bulletin* 1928 v 25 963 1929 v 26 551 1933 v 30 694 1934 v 31 395 802 1937 v 34 428 1939 v 36 146 847 1945 v 42 55]. (2) Bachman's serum precipitin test [see this *Bulletin* 1928 v 25 470 1930 v 27 980 1942 v 39 194 196]. (3) Complement fixation with *Trichinella* antigen Gaase *et al* [see this *Bulletin* 1930 v 27 981 1933 v 40 478 1946 v 43 236]. (4) Microscopic flocculation slide test of Suescenguth and Kline [see this *Bulletin* 1946 v 43 359 360]. (5) Microscopic precipitin test carried out by placing living *Trichinella* larvae artificially digested to free them from their capsules in serum. Immune serum (perhaps the euglobulin fraction) gives this precipitate. The technique is fully described by the author those interested should consult the original it is too detailed for transcription here.

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negative but these are not comparable because various antigen dilutions were used and differing reading times.

In the Borås epidemic, 80 samples of blood were obtained from 45 suspected patients, and 9 months later 4 samples from two others living on a farm where trichinised meat had been eaten. Positive results were given by the sera of 36 who had presented typical symptoms. The 11 negative had been ill with indefinite symptoms, by no means typical, hardly even suggestive, of trichiniasis. The times when positive findings were observed are worth noting: Of 24 samples tested within the first 10 days of illness only 3 were positive; of 17 during the second 10 days 23 were positive; of 27 taken between the 21st and 70th days all were positive. Of the 36 reacting positively, 26 were tested by the Bachman precipitation test and 25 reacted. [Later it is stated that "Practically all patients suspected in connection with the trichinosis epidemic were submitted to one or more intradermal skin tests with antigen dilutions 1:10,000, 1:2,000 or 1:1,000. The outcome was not always quite uniform, not even in the same patient. . . . Altogether 25 of these patients gave a positive reaction, which in 17 appeared as the characteristic immediate reaction with enlargement of the injection papules and, in most cases, with formation of a broad zone of erythema, so that the redness could still be demonstrated after 24 hours. In 8 cases the reaction was only slightly positive, mostly in the form of a delayed reaction after 24 hours. In 5 cases the reaction was considered dubious—in 2 of these patients the reaction to the simultaneous control injection with saline was just as strong as that with the antigen. Finally, 4 patients were entirely negative." Re-examination 7-8 months later showed that the antibody content had considerably diminished, but was still demonstrable and then gradually faded, persisting longest, it would seem, in those most heavily infested.

In some cases the dermal reaction appeared earlier than the serological, but he results were too inconsistent for any valid deductions to be drawn.

The author concludes that the intradermal test did "not quite come up to the great expectations suggested by most of the reports in the literature," and that the new microscopical precipitin test with living larvae is the most sensitive and specific. [A paper of great interest.]

H. Harold Scott.

MOOREHEAD, M. T. Roentgen Therapy and Trichiniasis: Report of Unusual Case of Trichiniasis treated with Apparent Success by Irradiation with Study of Quality of X-Rays used and Review of Subject. *Maine Med. Ass. J. Portland*. 1946, June, v. 37, 141. [Summary taken from *J. Amer. Med. Ass.* 1946, Aug. 31, v. 131, No. 18, 1533.]

Moorehead reports a case which was noteworthy because of the appearance of a sizable extrathoracic tumor mass late in the course of an undiagnosed severe infection by *Trichinella spiralis* in a man aged 44, a Filipino. This mass had the external appearance of sarcoma but at operation proved to be trichinous. After operation a severe suppurative condition of the chest wall developed at the operative site. This failed to heal despite months of varied treatment and eventually became a serious threat to the patient's life. Complete recovery took place with surprising rapidity following the use of roentgen therapy. The total amount of X-radiation given the patient was approximately 500 roentgens as measured in air. This seems to be the first report of a tumor-like trichinous lesion and also the first instance of the successful use of roentgen rays in the treatment of trichiniasis.

DEFICIENCY DISEASES

BURGESS R C Deficiency Diseases in Prisoners-of-War at Changi, Singapore, February, 1942, to August, 1945 *Lancet* 1946 Sept 21, 411-18, 2 figs [11 refs]

... the Japanese in Changi Camp describes the state of nutrition of the prisoners of their internment. For nutritional purposes it may be divided into 3 periods — the first four or five months when the diets were inadequate in calories and the vitamins of the B complex the second of nearly 3 years when the diets were more or less adequate, and the third period (the last six months or so) when the diets were grossly inadequate in calories and contained less than minimal requirements of the vitamin B complex.

Throughout the whole time there was ample vitamin A value in the diets derived from the carotenes of red palm oil and green leaves. Also there was sufficient vitamin C supplied in roots and leaves. Sprats and dried fish supplied

... vitamin B₁ is generally estimated in reference

... Unfortunately all authors are not in agree-

... foodstuffs. In correlating the

... of this vitamin in the diet

... of WILLIAMS and SPIES

The latter give lower values than the former

Beriberi appeared in six weeks on a daily intake of 0.39 mgm (0.2 mgm)

Spiess

During the early months there were cases of the encephalopathy of Wernicke. "Treatment and prophylaxis with vitamin B₁ were eminently satisfactory." During the last months when the protein intake fell to 40 gm daily per person there were many cases of nutritional oedema which complicated the diagnosis of beriberi.

The conditions which appeared when the riboflavin level in the diets was low were — angular stomatitis, glossitis, palatal erythema, scrotal dermatitis, aching feet, keratitis, retrobulbar neuritis and nerve deafness. These signs appeared on 80 days on an intake of 0.21-0.25 mgm of riboflavin per 1,000 calories, persisted on a level of 0.35 mgm and the outbreak did not end until the level reached 0.5 mgm per 1,000 calories.

During the first 18 months of the internment there were 40 cases of spastic paraplegia.

The occurrence of a pellagroid skin rash had some relationship to a low intake of niacin.

The incidence of the signs of riboflavin deficiency was less among those recruited for labour under conditions of starvation and appalling hardship when 44 per cent died. Dr Burgess states — "When a man is consuming his ... and again ..." The impression

namely that there may be extreme deficiency gravely affecting the metabolic processes of the body without any particular manifestations, such as the mouth and skin signs, appearing.]

During the first year 80 per cent. of the prisoners suffered from bacillary dysentery, usually in a mild form; later amoebic dysentery occurred and became increasingly common. The camp was free from malaria until the last 18 months and then 70 per cent. of the prisoners became infected. [This paper by Dr. Burgess and other papers by others who have done similar devoted work in the prison camps of the Far East are a great contribution to present-day knowledge of human nutrition.]

L. Nicholls.

JÖRG, M. & AGUIRRE, J. A. Investigaciones sobre enfermedades Carenciales. Expresión radiológica de alteraciones intestinales en hipovitaminosis B y estados de desnutrición en el hombre. [Deficiency Diseases. Radiology of the Intestine in Vitamin B Deficiency and States of Undernourishment in Man.] Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina (Jujuy.). Publicación No. 72. 1946, 68 pp., 60 figs. [41 refs.]

The authors state that there are three factors essentially dietetic, which may lead to deficiency of the vitamin B complex: (1) Consumption of bread and other foods made with white flour; (2) prolonged cooking of vegetables and addition of alkalies, bicarbonate of soda, baking powder, etc.; (3) excessive consumption of carbohydrates. They describe in minute detail the morbid anatomy and histology and anomalies of secretion of the small intestine in conditions of vitamin B deficiencies, especially of thiamin, and present X-ray pictures of the changes in motility and muscular tone of the bowel and the production of the "wax mould", "accordion", "fragmentation" and "fish skeleton" appearances from localized pocketing and stagnation of contents. These changes, of course, are not specific for avitaminosis B. Brief notes are given of six cases, patients who for one cause or another had subsisted for a long time on a restricted diet.

Probably the most interesting section of the article is that describing the morbid histology of the intestine, and the alterations in the nerves of Auerbach's plexus, notably neurofibrillosis and disintegration of the fibrils, nodular swelling of them and of the axis cylinders of the ganglion cells. Various stages of degeneration may be seen; simple fusiform or nodular swellings with oedema of the neuropilasm and dissociation of the fibrils. These changes are well shown by photomicrographs of tissue stained by Cajal's method.

H. Harold Scott.

BRENNAN, D. J. The Burning Feet Syndrome: Observations of Cases among Prisoners of War in Manchuria. *Med. J. Australia*. 1946, Aug. 17, v. 2, No. 7, 232-4.

- "1. The 'burning feet' syndrome is described as it occurred amongst prisoners of war in Manchuria.
- "2. A gross disorder of the peripheral vascular system was the most conspicuous feature in the advanced cases of this syndrome.
- "3. It is possible that these changes were the result of a disturbance of the autonomic nervous system, and aggravated by cold.
- "4. The causal factor appears to be a deficiency of some part of the B complex."

WEINBERGER E. Une épidémie de beri beri secondaire au Kivu [An Outbreak of Secondary Beriberi at Kivu] *Rec Tra aux Sci Méd Congo Belge* 1946 May No 5 236-60 [19 refs]

Kivu is a district of the Belgian Congo. By the term secondary beriberi the author implies the condition known also as epidemic oedema ascribed to non

symptoms were oedema, polyneuritis, gastroenteritis and cardiac disturbance in some ending in rapid death. Eight autopsies were carried out but beyond pulmonary and hepatic congestion and dilatation of the right ventricle nothing very distinctive was found. No cause could be assigned. The best form of treatment proved to be reduction or exclusion of salt from the diet and the giving of hydrochloric acid with meals together with intravenous injection of 10 cc. of 15 per cent $MgSO_4$ twice a day for 2-4 days. The author records also that 0.3-1.0 cc. of sulphurated oil 1 per cent intramuscularly once daily for 2-4 days brought about a spectacular improvement of the neuritis [The composition of this oil is not given].

During the first 6 weeks of the outbreak no preventive measures were undertaken and 68 new cases were seen. During the next fortnight HCl was given with meals and NaCl removed from the diet and there were only 3 new cases and one relapse. Then for another fortnight no such measures were enforced and there were 36 new cases and 26 relapses. *H. Harold Scott*

CASANOVA Jean. Coeur et beri beri. Etude clinique, électrocardiographique et radiologique d'après cent observations personnelles [The Heart and Beriberi. Clinical Electrocardiographical and Radiographical Study of 100 Cases.] *Algerie Méd* 1946 May-June No 3 203-24 4 pls & 2 figs

While the grosser manifestations of beriberi have been closely investigated

opportunity for study of the heart has only been by daily clinical examination by serial orthodiagrams and by the Bouhite portable ECG apparatus. These men had already suffered from beriberi chiefly of the oedematous type in French West Africa and they became considerably worse under the conditions of climate, physical exhaustion and dietary deficiency obtaining in Southern Tunisia. Some relapses took the form of asthenia, slight nerve troubles and latent cardiac phenomena—such were the least severe and were rapidly relieved by vitamin treatment. Others took the form of dry beriberi with severe progressive cardiac involvement, nearly always fatal in spite of treatment. The author in company with the majority of writers had associated cardiac complications with wet beriberi rather than with the dry form which provided most of the material for his observations and he suggests that their severity in his cases might be due to the fact that these had previously suffered from wet beriberi and had subsequently relapsed.

After a clinical description of the wet and of the polyneuritic types of cases encountered the author states that in the dry form of the disease pulsation

without obvious cause, the slightest exertion raising it by 30 or 40 beats per minute; it took up to 22 minutes to return to its initial rate. Daily intravenous injections of atropine in 50 cases produced little effect. Digitalis increased the pulse rate and also aggravated the feeling of ill-health of the patients, so constantly that the author regarded it as a diagnostic test for beriberi. The action of vitamin B₁ given in various forms was very variable. In the wet form of the disease, when the oedema diminished rapidly the pulse rate diminished, and the electrocardiogram returned to normal if there were no disorder of conduction. This return to normal was also seen in early forms of the dry disease. In the dry disease of some months' standing, however, vitamin B₁ in prolonged and massive dosage failed to slow the pulse rate, as cardiac degeneration was established; but the heart size diminished if the patient was kept prone and well cared for. In the chronic dry disease the pulse slowed only in two patients, both of whom developed mild infective jaundice while under observation, and it quickened beyond the initial rate after the attacks subsided with the development of a progressive and fatal myocarditis in both cases.

In a table are recorded the blood pressures, the pulse rates, and the rapidity of return to normal of the latter after exercise, of 34 patients suffering from dry beriberi. These show that the blood pressures and pulse rate bear a constant relation. In the wet form the blood pressures were lower, and the differences between systolic and diastolic were less. The venous pressure was raised in 10 cases, selected at random, being from 18 to 20 cm. of water. The liver was not enlarged except in the terminal stages.

Heart irritability was evident as a simple tachycardia without arrhythmia; the sounds were accentuated, and systolic murmurs of inorganic origin were heard in all areas, a small systolic murmur being followed by a sharp second heart sound. In some cases gallop rhythm occurred.

Radiography of the chests of 60 dry cases with cardiac changes showed enlargement of the heart shadow, especially on its right side; and there was increased amplitude of the ventricular contractions with exaggeration of the pulsations in the ascending aorta and especially in the pulmonary infundibulum.

After reviewing the literature on the subject, the author records in some detail his own findings in numerous E.C.G. tracings from his cases, and reproduces a few examples of these as illustrations. From his studies he concludes that the increased rapidity of the cardiac rhythm in beriberi is of sinus origin; and the myocardial troubles affect the contractile power of the myocardium and interfere with intracardiac conduction. Disorders of rhythm and of tension are clinically manifest by marked cardio-vascular irritability.

The author discusses the factors governing the types of beriberi encountered in this group of cases, and finds that the Negro is much more susceptible to beriberi than the European, he is also more susceptible to heart disease. Early in the epidemic, deprivation of vitamin B₁ was abrupt, dysenteric disorders further increased it, and the wet cardiac type of beriberi was more common than the dry. Later the wet form disappeared to be replaced by the dry. Clinical experience indicates that marked polymorphism of beriberi occurs in the cardiac types of the disease. There are two extreme clinical types, one with generalized oedema and more or less marked cardiac involvement; and the other the pernicious dry form leading to early heart failure; all gradations between the two may be encountered; the dry form may become wet—but the pernicious heart complications ensue.

The heart is affected by overwork and deprivation of vitamin B₁; this when grave heart complications ensue. In the wet form may become dry, results in the wet form, where the heart rapidly shows its fatigue owing to obvious overload, but usually can rapidly be restored to normal by vitamin

therapy while in the dry form of long duration irremediable cellular changes occur which affect the contractile power of the myocardium and interfere with its conductivity

A R D Adams

RUSSELL Beatrice A S Malnutrition in Children under Three Years of Age in Ashanti, West Africa *Arch Dis in Childhood* 1946 June v 21 No 106 110-12 1 fig

This paper is a short account of not identical with that described working in a different region kwashiorkor [see this *Bulletin* 1934 v 31 344]. The features of the syndrome are oedema irritability muscular weakness and hypotonia loss of tendon reflexes depigmentation of the hair dryness and crazy pavement dermatosis stomatitis glossitis diarrhoea and anaemia Dr Russell makes the

malnourished

The history was usually that the child had been healthy until weaned at the age of 18 months or 2 years when the next baby was born Williams in her original description (*loc cit*) called this a disease of the displaced baby. The onset is related to the diet after weaning which in Ashanti consists mainly of maize plantains and cassava and contains no milk.

The treatment recommended is a high protein diet. Pure vitamins were found to be of little value. Mercurial diuretics were used with good effect when the oedema did not disappear with dietary measures alone. At post mortem the liver was found to be fatty in two cases.

[It is unfortunate that a more detailed description is not given of the skin lesions in view of the emphasis that has been laid on them by other workers

J C Waterson

GILLMAN T & GILLMAN J Treatment of Infantile Pellagra Assessment of the Value of Protein Hydrolysates *Lancet* 1946 Sept 29 446-8

The response to various forms of treatment of 161 cases of infant pellagra is summarized and illustrated in a table. The characteristics of this disease have already been described [see this *Bulletin* 1945 v 42 748 1946 v 43 59 237]. The mortality is high (40-60 per cent) and it is suggested that this is related to the presence of severe fatty infiltration of the liver which is one of the typical features of the disease. By means of serial liver biopsies the authors were able to assess the response of the liver to different forms of treatment.

Supplements were given in addition to a basal diet adequate for infants and children. The most satisfactory results were obtained with dried stomach 10 gm daily (mortality 6 per cent). After this the treatment of choice was by intramuscular injections of crude liver extract (10 ml daily). The addition of pure vitamins to dried stomach in the form of a preparation called Ventron (Parke Davis and Co) or to liver extract given by mouth appeared to increase the mortality. The worst results (mortality 78 per cent) were obtained with pure vitamins alone.

Three types of protein hydrolysate were also tried. Two were casein digests and one was a digest of whale-meat. In the trial of the first casein digest

α pyracin alone added to the diet gave no response in growth feathering or haemoglobin. No significant supplementary effect was noted with either *p* aminobenzoic acid or a vitamin B₁₀ and B₁₁ concentrate in the presence of an adequate amount of synthetic folic acid. Experiments with vitamin B₁₀ and B₁₁ preparations without added folic acid demonstrated the lack of correlation between chick growth and microbiological activity.

When sulfasuxidine (succinylsulphathiazole) was added to the basal diet conditions 25% comparative the absence of the drug as in its presence thus raising the possibility that folic acid act indirectly to some extent.

F Murgatroyd

SPRUE

PAULLY J W & ARKEN G J Nicotinamide Methochloride Estimations in Sprue and Amoebiasis *Lancet* 1946 Oct 5 486-7 4 figs

The authors used the method of COULSON *et al* (1944) and ELLINGER *et al* [this *Bulletin* 1945 v 42 926]

For three days 24 hour specimens of urine were collected from patients on ordinary hospital diet for the next five days the same procedure was continued save that patients were given 100 mgm nicotinamide at the commencement of each 24 hour period. Each test lasted eight days. In 2 controls 2 cases of sprue 6 convalescent from sprue and 4 of amoebiasis nicotinamide was injected parenterally. To the remainder—7 controls 4 convalescent from sprue and 3 of amoebiasis—the same substance was administered by the mouth.

The method of determining the amount of nicotinamide methochloride in the urine is as follows—

Nicotinamide methochloride is separated from the urine by adsorption on Decalco from which after washing with water it is eluted by potassium chloride solution then rendered alkaline and extracted with 150 butyl alcohol. The fluorescent derivatives thus produced are compared with standards by usual fluorimetry.

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pellagra

The excretion in two cases of florid sprue did not differ from that in patients convalescent from sprue.

Whether nicotinamide was given orally or parenterally to patients convalescent from sprue and to controls the level of excretion was similar. This indicated that poor intestinal absorption of the vitamin was not a factor in cases without intestinal hurry. Patients with amoebiasis either those with active disease or those who were passing cysts excreted less than the controls but slightly more than the patients with sprue. Only two had diarrhoea and both received nicotinamide parenterally.

The subnormal excretion in patients convalescent from sprue who presented no symptoms and had received ample nicotinic acid during treatment was surprising. Equally surprising was a similar deficient excretion in cases of amoebiasis.

It would be unwise to draw definite conclusions from these few results; a larger series is required.

It is suggested that behind this deficient nicotinamide-methochloride excretion in sprue and amoebiasis there may lie deficiencies of other members of the vitamin-B complex, known or unknown, whose relation to sprue may be of direct importance.
P. Manson-Bahr.

MAEGRAITH, B. Effect of Phosphate on Carbohydrate Absorption in Sprue.
[Correspondence.] *Lancet*. 1946, Sept. 14, 399-400.

The author refers to a preliminary communication [see this *Bulletin*, 1946, v. 43, 238] in which he and his collaborators reported experimental evidence that in active sprue there may be a failure of the phosphorylation of glucose at the time of its absorption.

In this letter, he reports on the effects of adding phosphate to carbohydrate solutions administered to cases of active sprue.

A patient with typical active sprue was subjected to an oral sucrose-tolerance test. The usual flat glucose and normal fructose absorption curves were obtained. This was confirmed by repeating the test by direct duodenal intubation of the sugar solution. Later, intravenous glucose produced a normal curve of disappearance of the sugar from the blood.

It was therefore presumed that the flat glucose curve was due to failure of absorption. The accessibility of the phosphate ion was investigated, in the belief that its exhibition, if phosphate was present in some inaccessible form, should restore the process of phosphorylation.

The sucrose-tolerance test was therefore repeated. the sugar was administered into the duodenum and 8 gm. of a mixture of potassium acid phosphate and disodium phosphate buffered at pH 7.0, was added.

The startling result was obtained that the glucose curve became normal but the fructose curve remained unchanged. A sucrose test made a week later without the phosphate once more produced the flat glucose curve. Some time later the sucrose plus phosphate test again resulted in a normal glucose curve.

Figures are given which demonstrate this finding strikingly.

In two of three other less active cases of sprue, phosphate appeared to assist the absorption of glucose.

Although the results are incomplete, the author suggests that in cases where glucose absorption is restored to normal in the presence of the phosphate ion, the latter might prove a valuable therapeutic agent.

H. J. O'D. Burke-Gaffney.

HAEMATOLOGY.

GIBSON, Q. H. & HARRISON, D. C. Blood Haemoglobin: the Relationship between Oxygen Capacity and Iron Content of Blood in Men and Women.
Biochem. J. 1946, v. 40, No. 2, 247-9.

During previous studies on haemoglobin determinations it was found that the haemoglobin value of male blood, estimated by the oxygen capacity measurement, appeared slightly but consistently lower than that obtained from the determination of the iron content of the blood [see this *Bulletin*, 1946, v. 43, 773]. This fact had also been noted by other workers, who, however, unexpectedly found that in female blood the relationship was reversed. If there was, in fact, a systematic sex difference in the iron: oxygen ratio, there might also be a sex difference in the iron: colour and oxygen: colour ratios, and

pyracin alone added to the diet gave no response in growth feathering or haemoglobin. No significant supplementary effect was noted with either *p*-aminobenzoic acid or a vitamin B₁₀ and B₁₁ concentrate in the presence of an adequate amount of synthetic folic acid. Experiments with vitamin B₁₀ and B₁₁ preparations without added folic acid demonstrated the lack of correlation between chick growth and microbiological activity.

When sulfasuxidine (succinylsulphathiazole) was added to the basal diet the chicks developed a more severe deficiency and under these conditions 25%

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The control figures were found to agree with those of Ellinger *et al*.

Subnormal excretion resting and after test dosage was found in patients convalescent from sprue who had had no symptoms for three months or more and who had received nicotinic acid and liver treatment in India. Figures of excretion in this group were slightly higher than those of Ellinger *et al* for pellagra.

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different haemoglobin equivalents might be required for the artificial standard when used with blood from the different sexes. It was decided, therefore, to carry out parallel determinations of oxygen capacity and iron content on the

ations using the artificial standard were made according to the method described in the authors previous paper the samples being compared in a Spekker absorptiometer using Hilger Chance OGr 1 green filters.

The results of examining 10 men and 10 women showed no difference in oxygen capacity between the two groups. The difference in iron content was not significant.

VENOMS AND ANTIVENENES

KIRK, R. & CORKILL, N. L. The Venom of the Rhinoceros Viper *Bitis nasicornis* (Shaw). *J Trop Med & Hyg* 1946 Feb-Mar v 49, No 1, 9-14, 2 figs [17 refs]

B. atropos or *B. caudalis* (given by GRASSET, ZOUTENDYK and SCHAAFSMA as 0.4, 0.15, 0.3 and 0.3 mgm respectively as mild for mice [see this *Bulletin* 1936 v 33 383]) and it does not really spit, like the spitting Cobra *Naja nigricollis* but the venom is ejected incidentally by contraction of the jaw muscles. A small amount only was obtained from this specimen but certain experiments were carried out with it. The mild subcutaneously administered to mice proved to be 0.5 mgm intravenously a smaller dose was more rapidly but the authors had not enough venom to test this precisely. It had considerable spreading effect in fact one of the most formidable complications of bites by this snake if not fatal is extensively spreading sepsis. The spleen, lungs and kidneys are found congested *post mortem* and punctate haemorrhages are marked in the two latter organs. The spreading effect is due to a proteolysin which was tested by Grasset and Schaafsma's method with different strengths of the venom on gelatin in saline. A haemolytic factor is also present but it seems to be small in quantity and would have no practical effect on human beings bitten by this snake. It is suggested that the haemolytic factor, the spreading factor and the proteolysin may be identical [but the spreading factor is said to be great while the haemolytic is but small]. Thrombase is not present in appreciable quantity. H. Harold Scott

BINET, L. & WELIERS, C. Recherches sur le venin de la Cobra [I] sulfhydrique de Cobra [I] Sulphydrique Co July-Sept. v 43 1905 1/19 636-9

VAN RIFER, W. DDT and the Black Widow Spider. [Correspondence.] *Science*. 1946, Aug. 2, 111.

When climatic and other conditions are favourable, houses may be inundated with collections of young Black Widow Spiders (*Latrodectus mactans*) which may grow to maturity and constitute a potential danger to young children. These pests are not susceptible to ordinary lethal substances, and they are very difficult to eradicate by individual hunting, owing to their retiring nature.

The author, in the Colorado Museum of Natural History, Denver, tested the effect of DDT on a mature female Black Widow Spider which was encouraged to make her web in a cigar box. A 10 per cent. solution of DDT in kerosene was sprayed very lightly on the outer part of the web, care being taken to avoid the spider and her retreat in the inner portion.

After 24 hours, she was seen half-way down the web, showing constant twitching movements of the legs. The next day she dropped from the web and was dead. Five additional spiders were placed in sequence in the same web, without additional spraying, and they all died in a couple of days.

The author is satisfied that a single spraying of the web of *L. mactans* with 10 per cent. DDT in kerosene is lethal to the spider and that the effect of spraying lasts for some time.

H. J. O'D. Burke-Gaffney.

DERMATOLOGY AND FUNGUS DISEASES.

MONTESORI, P. P. La granulomatosi coccidioidi in Europa. [Coccidioides Granulomatosis in Europe.] *Mycopathologia*. The Hague. 1941, Aug. 10, v. 3, No. 2, 131-9. [11 refs.]

Hitherto coccidioidosis has been regarded as a Californian disease; but of the four patients recorded here three had never been out of Italy and the fourth had never left Europe, nor, so far as is known, had any of them been in contact with a patient suffering from the disease. The cases referred to are:—

1. A girl of 14 years, living in Naples, recorded by BOERI and JACONO in 1929. She gave a history of cough for 7 years, with abundant sputum, at times haemorrhagic, bouts of fever, and, two years later, pleurisy which, however, soon cleared up, the other symptoms continuing in spite of all treatment. No tubercle bacilli were found, but a mycete was isolated and classed as *Blastomycoides*, and an intradermal reaction was obtained with a species of *Cryptococcus*. X-rays showed scattered shadows mainly about the hilum and a small cavity posteriorly at the level of the Vth vertebra.

2. A man of 40 years (in 1929) working in the Naples grain silos; symptoms similar and "*Blastomycoides Castellani*" is said to have been isolated. A study of this proved it to be identical with *Coccidioides immitis*.

3. A Neapolitan woman (in 1933) with gluteal swelling and later ulceration extending deeply, after local injection of camphorated oil. *Glenospora meteuropaica* isolated.

4. The same fungus isolated in 1936 by CASTELLANI from a Balkan patient in London. It was found to be closely allied to, but not absolutely identical with, *Coccidioides immitis*, and was named *C. immitis* var. *meteuropaica*.

Experiments were undertaken by the author to determine the rate of growth of the fungus in rats.

In rats old cultures had inflammatory granulomata and

A second experiment showed that the Neapolitan strain was the same as Balkan, i.e. both were *Coccidioides immitis*. Next the same three kind animals were inoculated with strain

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no change was detected

It is concluded that the slight polymorphism of growth—character of capsule and number of sporangia (these are not detailed)—in parasitic conditions are not enough to warrant conferring a new specific rank or variety, on the Neapolitan and Balkan strains. The main question is the fungus found in these recorded cases autochthonous or has it been imported. Three of the four patients lived in a coast town.

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Harold Scot

BURKS J W Jr & THOMPSON P E *Coccidioidomycosis* Southern Med
1946, Aug 1 39 No 8 613-20 7 figs [17 refs]

A white American soldier aged 27 who had recently served in California and the Arizona Mexico border region became ill with shortness of breath, alptation. Three days later his temperature rose to 103°F and a circumscribed erythematous rash appeared on the extremities and the upper part of trunk. There were no other signs or symptoms and the illness lasted four days. Three or four weeks later a small

lip and became crust

metres in diameter

upper part of the back

under X ray treatment but new lesions appeared on the nose involving left ala and the floor and septum causing partial obstruction of the left nostril by the projecting papillomata. The coccidioidin skin test gave a negative result, and microscopical examination of biopsy specimens from the nose yielded no positive evidence but sowings from the same biopsy material on potato-maltose agar and Sabouraud's medium gave a growth of *Coccidioides immitis* in 3 days at 37°C. A precipitin test with the patient's blood. *Coccidioides* antigen gave a negative result but the complement fixation reaction was positive to a titre of 1:32. These results in conjunction, taken as evidence of a severe coccidioidal infection which might account for the failure of the coccidioidin skin test.

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SILVA, M. S. Tratamento da blastomicose sul-americana (granuloma paracoccidioidico ou moléstia de Lutz, Splendore e Almeida, blastomicose Brasileira). [Treatment of South American Blastomycosis (Lutz's Disease).] *Rev. Brasileira Med.* Rio de Janeiro. 1945, Nov., v. 2, No. 11, 918-27, 22 figs. English summary.

Paracoccidioidal granuloma, or the Lutz-Splendore-Almeida disease, to give its full name, is usually treated by oral administration of one of the sulphon-pyridine, sulphadiazine or sulphamerazine toxic. Another method is by vaporizing and allowing absorption into the lungs from this; a third method is a combination of these two, oral administration and direct pulmonary administration by inhalation through the nose.

Details are given of seven patients so treated. Cough usually cleared in 2-3 days and "clinical cure" was obtained within a month, but the amount of the drug used varied within wide limits; one needed less than 50 gm. while another had 250 gm. It is necessary for the patient to be in hospital while this form of treatment is being carried out
H. Harold Scott.

NIÑO, F. L. Nueva observación de granuloma paracoccidioidico en la Republica Argentina. Estudio clinico y micológico. [Clinical Paracoccidioidal Granuloma in Argentina.] *Mycopathologia* The Hague. 1941, Nov. 10, v. 1, No. 1, 1-10, 1 fig.

GIRARDI, V. C. & KHOURY, C. Observación de pie de Madura en Buenos Aires. [Observation of Madura Foot in Buenos Aires.] *Rev. Asoc. Med. Argentina.* 1946, June 15, v. 60, No. 583, 487-90, 2 figs. [22 refs.]

Mycetoma is sufficiently rare in the neighbourhood of Buenos Aires to warrant the publication of a new case. The patient, a male Argentinian aged 22, had suffered for four years from an affection, of unknown origin, of the right foot, which was first noticed as a prominent but not sharply defined swelling on the dorsum, without local heat, redness, pain or any apparent involvement of the overlying skin. Six months later a sinus opened in the site of the swelling and discharged yellowish pus [no reference is made of the presence of "grains" in the pus]. The swelling extended progressively to the sole of the foot and the retromalleolar fossae and involved the whole dorsum anterior to the mid-tarsal articulation, causing much deformity. X-ray examination showed

diagnosis of arthritis and a biopsy examination was made which led to the new diagnosis of mycetoma caused by *Actinomyces madurae* [the parasitic grain of *A. madurae*, in the lesion, is sufficiently characteristic to be the basis of this diagnosis]. The patient was ordered intensive treatment with iodide of potassium and the local application of radio-therapy, but he returned to his home and his subsequent history is not available.
J. T. Duncan.

VAN DER SAR, A. & HARTZ, P. H. Mycetoma Pedis. Case Report. Reprinted from *Amer. J. Clin. Path.* 1946, Feb., v. 16, No. 2, 129-38, 9 figs [11 refs.]

REDAELLI, P. Das Immunitätsproblem bei den Mykosen des Menschen. [The Problem of Immunity in Human Mycoses.] *Mycopathologia*. The Hague. 1943, Aug. 30, v. 3, Nos. 3/4, 280-309, 1 fig.

HEAT STROKE AND ALLIED CONDITIONS

BURCH, G. E. Study of Water and Heat Loss from the Respiratory Tract of Man. Methods: I. A Gravimetric Method for the Measurement of the Rate of Water Loss; II. A Quantitative Method for the Measurement of the Rate of Heat Loss. *Arch Intern Med* 1945, Nov-Dec, v 76, No 5, 308-14, 3 figs. [Refs in footnotes]

This relatively simple gravimetric method for the measurement of expired water is claimed to yield a mean accuracy within about 0.3 per cent. The inspired air passes through a meter to measure the ventilation rate. The expired air, as it leaves the subject's mouth, is heated to prevent premature

air can be determined. This is done also in a separate collecting system to measure the water vapour content of the inspired room air. The collection of moisture from the inspired air of the subject is carried out for five minutes, while simultaneously an equal volume of room air is passed through the second circuit. The weight of water collected from the subject's respiratory tract represents the water inspired in the room air plus the water added during respiration. By subtracting the water contained in an equivalent volume of room air the water actually lost from the respiratory tract can be calculated.

The method and apparatus just outlined with small modifications enable the total heat loss from the respiratory tract to be measured and to be partitioned into its several components. Heat loss by evaporation of water is calculated by measuring the water loss as already described. To measure the heat loss due to warming of inspired air the temperatures of inspired and expired air are measured by means of thermocouples, since the mass of air inspired is known (the mass of water removed having been measured) and also its specific heat, the heat loss due to warming inspired air can be calculated. The third channel of heat loss from the respiratory tract is due to the decomposition from solution of carbon dioxide. This is measured by determining the subject's oxygen consumption, using a Benedict Roth machine over a short period just after the previous observations, the CO_2 output is then obtained, assuming an R Q of 0.83. Thus the total respiratory heat loss may be expressed as follows—

$$H = h_e + h_c + h_d$$

where

H = Total heat loss from the respiratory tract

h_e = Heat loss by evaporation of water from the membranes of the respiratory tract

h_c = Heat loss by warming inspired air (convection) (this may be a positive number if air warmer than body is inspired)

h_d = Heat loss by virtue of the decomposition of H_2CO_3 in solution to CO_2 gas which is expired

ations for each of the
this equation in the
J. S. Bener

BURCH, G. E. Rate of Water and Heat Loss from the Respiratory Tract of Normal Subjects in a Subtropical Climate. *Arch Intern Med* 1945, Nov-Dec, v 76, No 5, 315-27, 9 figs. [Refs in footnotes]

The respiratory water and heat loss of a large number of individuals living in a subtropical climate was measured under various conditions of room

temperature and humidity. Measurements on 56 subjects in comfortable surroundings showed little difference in respiratory water loss as between negroes and whites, male or female. The respiratory water output was highly correlated with the ventilation rate.

In cool dry or cool moist conditions there was no significant change in the total respiratory water loss. It was increased by a hot (50°C.) and dry (18 per cent. R.H.) environment and noticeably decreased in a hot (50°C.) and moist (49 per cent. R.H.) environment. The relative humidity of the expired air varied with the inspired air, the extremes being 78 and 97 per cent. In a comfortable environment the respiratory heat loss by evaporation was on average about 0.5 kilogram calories per square metre per ten minutes. This represents about 6 per cent. of the total loss of heat from the body and just over 50 per cent. of the total respiratory loss. The remainder of the respiratory heat loss is due to heat used in warming the inspired air—one-sixth of the total—and to heat absorbed by the liberation of CO₂ from solution—about one-third of the total. The total respiratory loss due to these three components represents about 11 per cent. of the total loss of heat from the body in comfortable conditions.

In cool conditions, heat loss by convection is somewhat increased. In hot, moist conditions, heat loss by evaporation is markedly reduced.

J. S. Weiner.

PASQUET, P. & HAULON, J. L'œdème cérébral dans le coup de chaleur et son traitement par le sérum glucosé hypertonique à 50 p. 100. [Cerebral Oedema in Heatstroke. Treatment by 50% Hypertonic Glucose.] *Rev. Méd. Nav. (Méditerranée et Outre-Mer)*. Paris. 1946, v. 1, No. 1, 9-14.

Intravenous injections of hypertonic glucose (25-50 ml. of 50 per cent. solution of glucose in "serum" [presumably physiological saline]) were given to eight cases of incipient heatstroke. There was immediate relief of symptoms, and the men were fit to return to duty after one or two days. The barest clinical details are given, and no mention is made of the condition of the skin, or of the presence or absence of sweating. None of the patients was hyperpyrexial; the highest temperature was 40°C. (104°F.). There was no loss of consciousness, although one patient was maniacal. Lumbar punctures were not made.

The treatment was based on the theory that the symptoms and signs—headache, dyspnoea, and tachycardia—are caused by cerebral oedema. The authors claim that the same method of treatment gives good results in more severe cases.

[In true hyperpyrexia it is a matter for argument whether the signs of central nervous system involvement are primary or secondary. They are usually preceded by complete cessation of sweating, and may be caused by the overheating of the body that results from the loss of evaporative cooling. A raised cerebrospinal fluid pressure is not always found on lumbar puncture. The cases described in this paper correspond more closely to those which have been called "heat exhaustion type 2" by LADELL, WATERLOW and HUDSON [this *Bulletin*, 1945, v. 42, 143], except that in this condition there is usually diminution of sweating, with objective changes in the skin (scaling, lichenification). Fever, tachycardia, and dyspnoea are present, but respond rapidly to rest in bed alone.]

J. C. Waterlow.

MISCELLANEOUS DISEASES

1946 Aug v 157 No

FETTES D Surgery in the Tropics
938 101-6

In this short paper some of the pitfalls which await the surgeon who is a newcomer to the tropics are described. In general the tropical surgeon must learn to adapt his methods to suit the climate and the habits and customs of his patients. That non urgent surgery should be postponed till the cool season whenever possible that Syme's amputation may give a more satisfactory stump in the case of Indian coolies than the modern methods which require an elaborate prosthesis and that such patients require careful supervision to prevent them from tearing off their dressings or from getting out of bed immediately after a major operation are lessons which must be learnt in the hard school of experience unless they are inculcated beforehand. The reader is warned never to forget that malaria typhoid and dysentery may cause acute abdominal symptoms which may be mistaken for surgical conditions unless the surgeon remembers that in every doubtful abdominal case he should consider the possibility that he may be dealing with a purely medical complaint that there may be a surgical complication of a medical disease present or that there may be two diseases present. A careful history of the order in which symptoms appear and a blood examination in every case will save many mistakes. Early typhoid fever with pain and tenderness in the right iliac fossa may lead to a mistaken diagnosis and an unnecessary operation. The differential diagnosis between amoebic typhilitis and appendicitis may be difficult and an operation may lead to haemorrhage and to the possibility of amoebic infection of any sinus which may develop. On the other hand it must be remembered that a fulminating appendicitis may occur during the course of a severe attack of amoebic dysentery and in such a case if the history is correct for appendicitis if the pain is of the severe type which indicates obstructive appendicitis if a leucocytosis is present and if the case is early an operation should be performed. In cases of more than 40 hours duration the Ochsner Sherren treatment should be combined with the course of emetine. Amoebic granuloma is liable to be mistaken for carcinoma of the sigmoid or rectum and in all lesions near the anal canal the possibility of amoebic infection must be excluded by sigmoidoscopy. Stool examination and a trial course of emetine before any operation is performed. Unrecognized hepatic abscess is responsible for more mistakes in diagnosis than any other tropical disease and should be suspected in all cases of unexplained low fever loss of weight and night sweats when a malaria case is not responding to treatment or if a patient is going downhill from no discoverable cause. Open operation for liver abscess is to be considered in patients who fail to progress after aspiration emetine and chemotherapy and for those in whom rupture through the lung has occurred in re-respiration days it was possible to obtain good results by that method even though the modern methods of preventing secondary infection were not then available. W L Harnett

GHYOOT E L Appendicite chez les noirs [Appendicitis in Natives of the Belgian Congo] *Rec Travaux Sci Med Congo Belge* 1946 May No 5 274-81 [17 refs]

This is an English translation of the author's summary —

- 1 Appendicitis is fairly frequent in Africans in the larger centres
- 2 The clinical features are not well-defined but tend to take the form of a

3. Appendix abscess is comparatively frequent and in some 30 per cent. of cases is the usual development of acute appendicitis.

4. Related peritonitis is not common, being seen in about 10 to 15 per cent. of cases.

5. Appendicitis is not confined to the more advanced natives of Léopoldville. It is found in more or less the same proportions amongst adult males in all classes. The rarity of the disease amongst females, and the fact that not a single case has been seen in children is noted, despite the frequency of helminthic infections in childhood, and the number of appendicitis-like symptoms reported in white children.

H. J. O'D. Burke-Gaffney.

EARLE, K. V. Pyrexia associated with Tick-Bite. *J. Trop. Med. & Hyg.* 1946, Feb.-Mar., v. 49, No. 1, 14-15.

BROUWER, D. Tropical Pyomyositis and Its relation to Deficiency of the Vitamin-B Complex. *J. Trop. Med. & Hyg.* 1946, Aug.-Sept., v. 49, No. 4, 77.

"In Java no evidence could be found that a vitamin-B deficiency played a rôle in the pathogenesis of tropical pyomyositis."

RANSFORD, O. N. Tropical Myositis in East Africa. *East African Med. J.* 1946, Sept., v. 23, No. 9, 278-84. [17 refs.]

GRALL, A. & GEYER, A. Deux cas de maladie de Kaposi chez le noir africain. [Two Cases of Kaposi's Disease in Africans.] *Med. Trop. Marseilles.* 1945, July-Aug.-Sept., v. 5, No. 3, 207-18, 7 figs

JHATAKIA, K. U. Observations on "Eosinophilic Lung". *Indian Med. Gaz.* 1946, Apr.-May, v. 81, Nos. 4/5, 179-84. [24 refs.]

The author analyses 140 cases of this condition seen by him during 1945. Patients were classed as suffering from "eosinophilic lung" who gave a history of asthmatic attacks or chronic cough, who had a leucocytosis above 10,000 per cmm., with eosinophilia over 15 per cent., and who had no other condition to which the eosinophilia might be due. All were residing in Bombay; 39 were working in grain-shops (inhalation of the dust of grain stores has been found as probable cause in a fair proportion of cases [? mites in the grain]); 106 were males, 98 adults, 8 children, and 34 were females, 4 of them children; 65 (46 per cent. of the total) were between 21 and 30 years of age, 30 (21 per cent.) were in their second decade, and 25 (18 per cent.) in the fourth. In 12 of the series there was evidence of allergy in some member of the family, and in 6 families more than one member was found to be a sufferer from the disease. The duration of illness varied within wide limits, between 16 days and 15 years. In one of those detailed the leucocytes numbered 63,450 per cmm. and eosinophiles 73 per cent. before injections of acetylsarsen were started. In the laboratory findings the leucocyte counts ranged between 10,150 and 81,500 per cmm. and the eosinophil percentage between 15 and 90. The severity of the symptoms does not run *pari passu* with the blood count; the patient showing most distress had a leucocyte count of 12,000 and an eosinophilia of 18. Nor is the extent of the lung shadows proportional to the severity of the symptoms. Mites were looked for in the sputum of four only, and a single mite was found after prolonged search in one case. For treatment, the author mostly used acetylsarsen, 6-8 injections of 3 cc. at three-day intervals. The causation is considered briefly—the histamine, allergic, parasitic, viral and spirochaetal theories—but no conclusion is reached.

H. Harold Scott.

KESSLER A Lathyrism in Man *Harefuah* Jerusalem 1946 Oct 1 v 31 No 7 [In Hebrew 111 14 English summary 114]

[A general account of so-called lathyrism chiefly reiterating facts well known to readers of this *Bulletin* and to be found in all the best text books on the subject] The author states that this subject is acquiring increased importance in Palestine because inmates of a camp where the disease exists are finding their way into the country. He refers also to an outbreak in the Ukraine in which more than half the inmates (800 out of 1 400) of a camp were attacked. He gives a sketch of the symptoms which he states follow the ingestion of some 300 gm of *Lathyrus sativa* (the chick pea) for some weeks. [No reference is made to the fact that many authorities believe the symptoms to be due to poisoning by *Licium sativa* a weed contaminating the *Lathyrus*] The symptoms are those of a developing spastic paraplegia and arterial spasm which may lead to gangrene of the toes. Remedial treatment by vitamins A, B₁ and D has been recommended and tried but the results have not been promising. [The only effective treatment is removal of the cause and a careful outlook for the earliest symptoms—muscular cramps and frequent micturition. See this *Bulletin* 1946 v 43 492 787] H Harold Scott

GRANA P C Conjunctivitis and Dermatitis due to "Beach Apple" *Arch Ophthalmology* 1946 Apr v 35 No 4 421 2

During manoeuvres in Panama in 1942 a certain company of an infantry regiment used branches of a local shrub as camouflage. Within an hour or two 13 men reported sick with dermatitis and acute conjunctivitis—erythema and parts touched by the hands and

The shrub used was the man which is common in the West ILEN has described it briefly in

his work on *Poisonous and Injurious Plants of Panama* [see this *Bulletin* 1943

ulceration and desquamation. All parts of the plant however are toxic—a latex exudes from leaves, branches and fruit when cut or bruised and anyone sheltering under it from the rain may become affected]. The conjunctivitis is soon relieved by a boric acid wash and the skin irritation by a solution of bicarbonate of soda. [See this *Bulletin* 1939 v 36 415 1943 v 40 724 863. A sketch of the plant is to be found in BYAM and ARCHIBALD'S *Practice of Medicine in the Tropics* Vol 1 p 778.] H Harold Scott

HEATHCOTE R St A The Diamidines: their Pharmacological Actions and their Therapeutic Uses in some Tropical Diseases. *J Trop Med & Hyg* 1946 Feb Mar & Apr May v 49 Nos 1 & 2 1-8 33-8 [109 refs]

A useful and comprehensive summary of work published up to 1945

E M Lourie

The sandflies never attack man and will not feed on human blood in the laboratory. A precipitin test shows that some at least feed on bats (*Miniopterus*).

In details of structure of male genitalia the two species resemble certain American *Phlebotomus* rather than any others of the Old World.

A new *Anopheles* *A. tanhoofi* has also been described from this cave [this Bulletin 1946 v 43 1191]. The authors describe the caves and refer to the remarkable cavernicolous fauna.

P. A. Buxton

PARROT L. & WANSON M. Notes sur les Phlebotomes. LIII. Sur *Phlebotomus gigas* et sur *Phlebotomus mirabilis* [Notes on *Phlebotomus* LIII. *P. gigas* and *P. mirabilis*. Arch. Inst. Pasteur d'Algérie 1946 June v 24 No 2 143-52 9 figs]

PARROT L. & HABIBI A. Notes sur les Phlebotomes. LIV. Formes anormales de *Phlebotomus minutus* var. *parroti* Adler et Theodor [Notes on *Phlebotomus* LIV. Unusual Forms of *P. minutus* var. *parroti* Adler and Theodor.] Arch. Inst. Pasteur d'Algérie 1946 June v 24 No 2 157-9 3 figs]

FLOCH H. & ABOU-NEC E. Simuliidés de la Guadeloupe. *S. antillarum* Jennings et *S. tarsale* Williston [Simuliidae of Guadeloupe. *S. antillarum* and *S. tarsale*.] Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No 130 1946 July 6 pp 2 figs]

GILLET J. & WANSON M. La lutte contre les mouches à Léopoldville [Fly Control in Léopoldville]. Ann. Soc. Belge de Med. Trop. 1946 June 30 v 26 Nos 1/2 55-60 [22 refs.]

Domestic flies are a serious nuisance in Léopoldville and intestinal infections are very common. The authors report their observations on two species of fly which are abundant.

Chrysomya putoria is very common and dangerous because it enters houses and sits on food [unlike most of the refuse-breeding species of *Chrysomya* we believe]. It will deposit eggs even in very dark latrines and puts preferably in liquid excrement contents of septic tanks etc.

Musca culiciteriosa (specimens determined by van Emden) is a widely distributed African fly. The other species is much less common.

The authors describe the breeding places of these two insects in detail and show an intimate knowledge of local conditions. There are for instance storm water drains not trapped nor designed to carry sewage many domestic sewers have been connected to them illegally and the drains then suit the *Chrysomya*. There are also many septic tanks and squatting latrines without traps and therefore serving as breeding places. In general the nature of the soil is important for on a loose sandy soil many otherwise insanitary practices do not lead to the accumulation of liquids favoured by this fly. The construction of roads and buildings often leads owing to lack of sanitation to an outbreak of flies.

The authors have failed to find a cheap effective insecticide which might be sprayed into breeding places of the flies. As a first measure some of which and the like and are common. use what we should call a type of Ballour trap large numbers of these traps exposed round markets restaurants etc. catch kilograms of flies per month.

P. A. Buxton

DAVID, W. A. L. & BRACEY, P. Factors influencing the Interaction of Insecticidal Mists on Flying Insects. Part III. Biological Factors. *Bull. Entom. Res.* 1946, Sept., v. 37, Pt. 2, 177-90, 5 figs. [13 refs.]

The spray cabinet used for the experiments in this investigation has been previously described [this *Bulletin*, 1946, v. 43, 679]. It was assumed that the activity of the insect in flying through a mist of insecticide would determine the quantity of poison accumulated on the body. This was confirmed in several ways. Mosquitoes (*Aedes aegypti*) immobilized by light chloroforming and those with wings amputated were more resistant than normal insects; also, some batches of mosquitoes, which naturally displayed more activity than others, were more susceptible. Activity induced by mechanical stimulation increased the kill by insecticidal mist. Finally, a reversed experiment was performed in which the mist was moved at different rates over the mosquitoes (lightly chloroformed in a Buchner funnel). It was found that kill depended upon rate of movement of the air-borne mist sucked past the insects.

The kill of mosquitoes by mists of the insecticide DDT is largely influenced by the activity of the particular batch. Cyclohexanone, *Lethane 384* (n-butyl carbitol thiocyanate) and pyrethrins were all tested as activating agents to increase the effect of the DDT mist. Only the pyrethrins were effective and then at a non-lethal concentration.

Comparisons of the resistance of *Aedes aegypti* adults of various ages showed a steady decline throughout adult life (from one to fourteen days old). This occurred both with DDT and pyrethrum and it was proved not to be due to increased activity in older adults.

The relative resistance of males and females was about equal at the beginning of adult life but thereafter the females were always more resistant. Females that had had a blood meal were more resistant than females fed on sugar and water and this was not merely due to sluggishness and therefore to accumulation of a smaller dose. The lack of water supply greatly increased susceptibility of both sexes.

J. R. Busvine,

HERRIOTT, R. M. A Spectrophotometric Method for the Determination of p,p'-DDT. *Science*. 1946, Sept. 6, 228-30, 2 figs.

The method depends upon two facts.—(a) ultra-violet absorption curves of solutions of para-para'-DDT and ortho-para'-DDT (the chief impurity of commercial DDT) both show low absorption at 250 mμ. The corresponding olefines of these two compounds, which are obtained by hydrolysis, show high absorption at this wave length. (b) Hydrolysis of para-para'-DDT proceeds much more rapidly than that of ortho-para'-DDT.

The procedure, therefore, is to compare absorption of alcoholic solutions of the unknown before and after a short period of hydrolysis, the difference indicating the para-para'-DDT content. The method requires a Beckman quartz ultra-violet photoelectric spectrophotometer. With dry deposits, etc., taken up by alcohol, an amount of 10 to 50 μgm. of p-p'-DDT may be estimated in ten minutes, but if the DDT is in kerosene (which also absorbs in the region of 250 mμ) the accuracy is diminished. [The wave lengths are given as above in mμ. and the weights as μgm.]

J. R. Busvine.

GUNTHER, F. A. & TOW, Lois R. Inhibition of the Catalyzed Thermal Decomposition of DDT. *Science*. 1946, Aug. 30, 203-4, 1 fig. [14 refs.]

The presence of iron catalyses the decomposition (dehydrohalogenation) of DDT at high temperatures, and this may be responsible for much of the loss of active DDT from thermally generated smokes, etc., and possibly also from

IR Bustine

Nature 1946 Sept 14 378

common and hardy kafe bream (*Tilapia kafeensis*)

$r^2 = \frac{1}{n} \sum_{i=1}^n x_i^2 - \bar{x}^2$

1 in 48 million parts in the second series

mortality in 4 days

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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κ Ford Tredre

tions in the Fourth Service Command / *Econom Entom* 1946 June

In the early days of mobilization of the U.S. Army there were insufficient entomologists in the Sanitary Corps to deal with the pest insects and insect borne diseases but this was gradually remedied. Malaria was first attacked in the Fourth Service Command (headquarters Atlanta Georgia) being a serious menace because many of the reception areas were in or near swamps in highly malarious areas. Control measures included clearing ditch cleaning and other drainage operations as well as oiling. In 1942 23 gallons [U.S. gallon— $\frac{4}{5}$ British gallon] of oil were used per acre in killing larvae. Later in 1944 15 gallons were found sufficient. Finally DDT was applied at 0.2 to 0.3 lb. per acre in 3 to 5 gallons of oil. This saved much time and labour. The primary malaria rate in this Command was very greatly reduced in the years 1938 to 1943 but in 1944-5 there was a considerable increase due to imported malaria.

A second objective was the improvement of barrack hygiene by destruction of bugs and cockroaches. At first, bugs were attacked with heat and pyrethrum or thiocyanate sprays; but these measures were only palliative. Later, HCN fumigation (6 oz. per 1,000 cu. ft., for eight to twelve hours) was introduced. When army operators were trained to replace men from commercial firms, the cost was reduced by about 70 per cent. Cockroaches were first controlled by powder containing pyrethrum and sodium fluoride. Later, DDT was introduced against both bed bugs and cockroaches, with great improvement as regards efficiency and duration of control, ease of application and cost. A 5 per cent. solution in kerosene was sprayed at the rate of about 1 oz. per sq. yd. For the roaches a 10 per cent. dust was also used with or without the spray.

Prior to the advent of DDT, fly control was carried out by spraying breeding areas with diesel oil No. 2 and the use of fly traps, etc. When DDT became available, it gave good results in the form of a spray (to walls, for residual effect) used in latrines, mess halls and also used to kill emerging adults on the breeding places.

Preliminary results show that DDT-proofing of timber will be a useful measure to prevent termite attack of buildings.

J. R. Busvine.

KNIPLING, E. F. DDT to control Insects affecting Man. *J. Econom. Entom.* 1946, June, v. 39, No. 3, 360-66. [27 refs.]

As a result of extensive experimental work over three years, the use of DDT against certain insects affecting man has been developed to the point of provisional recommendations, as follows:—

Mosquitoes.

(a) Larvae.—For larvicidal use, 0.1 lb. DDT is used per acre, applied either in solution in petroleum oil, or in emulsion. This application must be repeated at intervals of one to three weeks, though a dose of 1-2 lb. DDT per acre remains highly effective for a month or longer. [The effect on fish, etc., does not seem to have been considered.]

(b) Adults.—For immediate action, the following formula can be used as an aerosol: pyrethrum extract 2 per cent. (0.4 per cent. pyrethrins); DDT 3 per cent.; an aromatic petroleum fraction (APS 202) 12 per cent.; "Freon-12" 83 per cent. For residual action a 5 per cent. kerosene spray or emulsion is used to give a deposit of 50 to 200 mgm. per square foot. For "area control", various sprays with droplets averaging 50 microns have been applied from aircraft at the rate of 0.1 to 0.6 lb. DDT per acre.

Lice.

(a) Body lice.—For rapid effective control, a 10 per cent. DDT dust (diluted with talc, pyrophyllite, etc.) is recommended. For persistent control, underwear should be impregnated by dipping in an emulsion or solution in "Stoddard solvent" [white spirit]. The underwear should be allowed to take up 1 to 2 per cent. of its weight of DDT, and this will last for six to eight launderings.

(b) Head lice.—The powder mentioned above is useful, but not always desirable. A less evident treatment is the application of the following liquid:—

Benzyl benzoate	68 per cent.	} Diluted with five volumes of water before use.
DDT	...	...	6
Benzocaine	...	...	12
"Tween 80"	...	...	14

Benzyl benzoate is included for its anti-sarcoptic value. Benzocaine is a useful ovicide; DDT does not kill eggs. "Tween 80" is an emulsifier (polyoxyethylene derivative of sorbitan mono-oleate).

(c) Crab lice can be eliminated by two treatments of DDT dust (with a week's interval between) or by one application of the above lotion.

Houseflies

A residual spray to leave 100-200 mgm. DDT per sq ft should be employed in addition to continued attention to general sanitation and destruction of breeding places.

Fleas

The dust and sprays recommended above are useful. One gallon of 5 per cent DDT spray for each 1 000 sq ft of surface is suggested. On earthen floors the dose should be increased.

Bed bugs

DDT makes an ideal insecticide for this purpose at 5 per cent in kerosene or as an emulsion. About 3 gallons [1 U.S. gall = 4.5 L. gall.] are required to treat a large barracks (to hold 70 men). A coarse spray such as that produced by an ordinary knapsack sprayer is recommended.

J R Bustire

MINISTRY OF SUPPLY. Some Properties and Applications of D.D.T. 34 pp. [31 refs.] 1946. London. H.M. Stationery Office. 6d.

EADS R B. A New Species of Rhopalosyllus Baker (Siphonaptera) from Texas. *J Parasitol* 1946 Aug. v. 32 No 4 407-8 1 pl.

STOCK F E. Collapse of the Lung and Porocephalosis. *Trans Roy Soc Trop Med & Hyg* 1946 Aug. v. 40 No 1 101-2 1 pl.

Since the larva of *Armilia armillatus* (*Porocephalus armillatus*) rarely produces symptoms its presence is usually detected only at autopsy although the parasite has been demonstrated during life in a few cases by radiograph or during surgical operations.

The author describes what is believed to be the first recorded case in which the parasite has been demonstrated during life.

The patient was a Nigerian native aged 40 years complaining of acute pain in the right chest accompanied by fever. Clinical examination indicated a raised right chest accompanied by fever. Complete collapse of the middle lobe of the right lung. At its hilum there was a small cork-screw like semicircular shadow which was definitely a calcified nodule of *Armilia*.

The patient recovered satisfactorily after treatment with sulphapyridine and during exercise. Three weeks later a radiograph showed complete expansion of the lobe of the lung but the shadow near the hilum remained unaltered.

The author considers that the lobar collapse may be attributed to the *Armilia* infection in the absence of other causes and in the presence of the calcified nodule in the immediate vicinity of the bronchus.

H J O D Burke-Gaffney

LABORATORY PROCEDURES

REIN C R & BOCKMAN H N. Merthiolate (Sodium Ethyl Mercurothiosalicylate) as a Preservative in Sera for the Serodiagnosis of Syphilis. *Amer J Syph* 1946 July. v. 30 No 4 342-3.

This paper is abstracted in the *Bulletin of Hygiene* 1946. v. 21 812 and is of importance to serologists in the tropics.

GÓMEZ RODRÍGUEZ, G. Valor del sulfato de zinc como fijador en técnica protozoológica y hematológica. [The Use of Zinc Sulphate as a Fixative in Protozoological and Blood Work.] *Bol. Asoc. Med. de Puerto Rico*. 1946, Mar., v. 38, No. 3, 95-7.

The author advocates the use of a mixture of an aqueous solution of zinc sulphate, two parts, and alcohol, one part, for fixation of blood films and faecal smears to be stained by Wright or Giemsa or iron haematoxylin. He claims that the methods he describes give results in a shorter time than do the usual procedures. [It is perhaps worthy of note that the solution of zinc sulphate is of the same strength as that employed in floatation techniques in which organisms may remain alive for a considerable time. One is led to wonder whether the fixation is due to the alcohol rather than to the zinc sulphate.]

C. M. Wenyon.

WHITE, D. G. A Hood to protect Precision Instruments in the Tropics. *Trop. Agriculture*. Trinidad. 1946, June, v. 23, No. 6, 115, 1 fig.

Humid tropical atmospheres are notoriously conducive to producing corrosion of precision instruments and to the development of fungi which bring about staining of the glass in lenses.

The hood is reproduced below, of a cellulose acetate biological supply firms, but having certain further advantages.

The hood is made sufficiently high to include a microscope supported by a small wooden table, under which is a container of calcium chloride to maintain dryness.

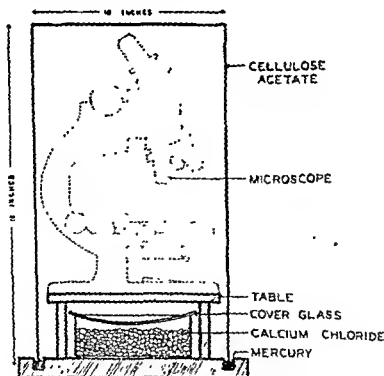


FIG. 1

Cellulose acetate hood for protecting precision instruments in the tropics

[Reproduced from *Tropical Agriculture*.]

The edges of the hood are made air tight by cementing with acetone if small pieces of cellulose acetate are first dissolved in the acetone warping will not occur

The cylindrical shape of the hood is achieved by attaching three wire hoops to the inside with adhesive tape The hood stands on a wooden base having a

laboratory

H J O D Burke Gaffrey

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

SOUTH AFRICA UNION OF Annual Report of the Department of Public Health for Year ended 30th June, 1944 [ALLAN P Secretary for Public Health] 22 pp 1 graph 1945 Pretoria Govt Printer [4s]

The Department of Public Health Union of South Africa has had many difficulties to contend with in carrying out its duties but much excellent work has been accomplished

Health education and propaganda are aided by means of films pamphlets posters and charts for school use this division is in the hands of the South African Red Cross Society of nursing staff and towards endeavour to find remedies for proved most valuable its Maternal Mortality rates In 1944 there were 333 employees

discipline personal hygiene and physical training and games proper feeding etc A number of Health Centres are to be established and £20 000 has been set aside for this purpose

At the end of 1943 the total population of the Union was estimated as 10 788 500 of whom 2 265 000 were Europeans Non Europeans comprised 7 039 000 Bantu 245 600 Asiatics and 874 000 coloured [these figures together come to 100 000 more than the total as stated] The birth rate among Europeans 25.9 per mille is higher than that of any other country except Portugal (26.1) England and Wales has 14.9 The death rate 9.5 is lower than that of any country except Holland (9.0) and New Zealand (9.4) that of England and Wales being 12.7 The European infant mortality rate was 47.31

accounting for 21.3 per cent., with bronchopneumonia second, 16.6 per cent. Still-births, were more than in the previous year 23.07 in place of 21.05 per 1,000 live births. The Asiatic infant mortality rate was 95.9 per thousand; among the coloured races there it was 153.27 per mille.

The Maternal Mortality rate in Europeans, was 2.85 per 1,000 live births; in Asiatics 6.06, and in the mixed and coloured races 5.1 per 1,000 live births.

As regards the death rate, figures for Europeans only are available and these not beyond December 1943. The figure, 9.53 per 1,000, is higher than in recent years, but lower than in 1937 (10.08). *Cardio-vascular disease* accounted for 22.3 per cent. of all deaths, 211.92 per 100,000, whereas in 1921 there were 103 per 100,000, or 9.9 per cent. of all deaths, attributed to this cause. The next commonest cause was *cancer*, which accounted for 11.5 per cent. of all deaths, 109.08 per 100,000. In 1921, only a little more than half this rate, 6.8 per cent. of all deaths, were so caused. The third in order, *pneumonia and bronchitis*, 92.23 per 100,000, also shows an increase. The *tuberculosis* death rate among Europeans, 33.16, is the lowest on record; in 1921 it was 58.26. This reduction is attributed by some to a drop in the cases of miners' phthisis. Figures for the Cape, Transvaal, Orange Free State, and Natal are given for males and females, for 1923 and 1943; from these it is seen that there has been a drop in all, except among males in Natal, where there has been a rise from 41.6 to 46.9 per 100,000. In the Transvaal the fall amongst males has been to less than half, from 74.45 to 36.52.

During the year under review there have been serious outbreaks of *typhus* and of *smallpox*. That of typhus was not, however, so severe as in 1920 and 1935. In 1944 there were 5,623 cases and 2,600 deaths, a fatality rate of 46.2 per cent. This outbreak was not quite so widespread as that of 1934-35, owing, it is thought, to the anti-typhus organization, the use of a mobile laboratory for obtaining information, to disinfection of clothing, inunction with naphthalene oil and injection of prophylactic vaccine. DDT was not obtainable from outside, so a local plant was set up for its manufacture; 30 lb. a month were made, and it is hoped that in 1945 as much as 500 tons will be manufactured. Typhus has been endemic in the Transkei for 50 years and this recent outbreak was limited to Transkei and Ciskei. Though the number of cases was less than in 1934 and 1935 the fatality rate was much higher (11.1, 14.5 and 46.2 per cent. respectively).

Smallpox occurred in 80 districts, affecting all four Provinces. Altogether there were 18 European and 1,028 non-European cases, and 71 deaths, all among the latter, a fatality rate of 6.8 per cent. The greatest number, 662, occurred in Natal. In this Province the disease had existed in a mild form for years, but in this outbreak it was of a much more virulent type, with a fatality rate of 9.3 per cent. (62 deaths).

Notifications have been higher than in 1943 for most infective diseases; exceptions were smallpox 1,046 (1,469 in 1943) and scarlet fever 2,237 (2,779). Cerebrospinal fever, 2,080, was more than doubled (931 in 1943), diphtheria 3,856 (3,417), acute anterior poliomyelitis 75 (36), puerperal fever 719 (565), tuberculosis 19,188 (17,136), and typhus 5,623 (2,879). Notifications of enteric (typhoid) fever have dropped from 3,917 to 3,486; the disease is commonest in the smaller towns where unhygienic conditions prevail. There were 839 European cases, 100 fatal (11.9 per cent.) and 2,647 non-European, 559 fatal (21.1 per cent.), but the figure is of deaths of natives registered in urban centres only.

Other diseases of which mention should be made are: Amoebic dysentery, leprosy, malaria, plague, schistosomiasis and tuberculosis. *Amoebic dysentery* was believed to be common, especially among non-Europeans, so an investigation was started in Durban and faecal examinations were made, with these

supervised by the health inspectors. The St. John Ambulance and the Red Cross Associations have given good support to the hospitals and the former played a large part in the organization and planning of the blood transfusion service. The facilities provided include free testing and immunization of

free radium
In 1938 a
Hospital
of radiographers was opened

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s of water supplies, milks
toxicological and other
as a record of work done

INTERNAT. LABOUR REVIEW 1946 May-June v 53 Nos 5/6 340-48 1uo
Conditions of Indigenous Workers in the Belgian Congo in 1944.

LAL R. B. & SEAL S. C. The Teaching of Epidemiology in India. *Indian Med Gaz* 1946 June-July v 81 Nos 6/7 261 1 map & 3 charts

The senior author has occupied since 1934 the first chair of epidemiology to be established in India. He describes the course of training planned when he assumed office. This follows the same general lines as some of the modern in the U.S.A.

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disease. Guidance is given. important literature. The authors state that this method of study arouses the keen interest of the members of their classes.

Examples are given of the practical study in the field of three outbreaks of cholera.

The system adopted is undoubtedly sound. It aims at teaching the students how to learn for themselves so that they may become perpetual students capable of keeping themselves abreast of all fresh advances in methods of controlling disease.

John W. D. Megaw

TROPICAL DISEASES BULLETIN.

Vol. 44.]

1947.

[No. 2.

THE DIAGNOSIS OF KALA AZAR.

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Kala azar, or visceral leishmaniasis, once looked upon as a disease of the tropics, is now known to occur in all the continents except Australia, and in a variety of climates, ranging from the frankly tropical to the temperate.

Increasing facilities for world travel and residence in countries where the disease is endemic, will, almost certainly, result in its occurrence in individuals returning to their own countries from such areas. This introduction of cases into countries where the disease does not normally occur, and cannot spread, has already been exemplified on an exaggerated scale as a result of the war. Thus, in Great Britain alone, some hundreds of cases have already been diagnosed in persons returning from war areas, and this number certainly does not represent the total number of cases introduced during the same period. What has happened in Great Britain must also have occurred in other countries to which persons from war areas have returned. The importance of making an early diagnosis in these cases, therefore, needs no further justification, and this is the more important in those countries where the transmitting vector exists, since such cases might lead to the spread of the disease.

The account of methods of diagnosis given below is not meant to be exhaustive and only those procedures are described which have proved reliable in practice and which can be applied in any laboratory without the use of special equipment or materials.

The most practical approach would, perhaps, be to consider a hypothetical case presented by the clinician for diagnosis and to describe the sequence of f kala azar. Such a case is likely fever the cause of which previous to elucidate. In any investiga-

tion aiming at the making of a definite diagnosis of kala azar it must always be borne in mind that the only infallible criterion is the demonstration of *Leishmania donovani*, either in the form of Leishman-Donovan bodies or in the form of flagellates in culture.

If one presumes, then, that the possibility of the case being one of kala azar has been envisaged, the following investigations should be carried out.

History.

This is important owing to the sometimes prolonged incubation period. If the patient has lived, even for a short time only, in any area where kala azar is endemic, the case for this disease is strengthened.

Such areas would be —

parts of the French possessions and the countries bordering on the Southern shores of the Mediterranean

In America—Various countries of South America such as Brazil and Argentina

In most of these areas except the Mediterranean kala azar is found to attack people of all ages especially older children and young adults

recorded in such adults

Clinical examination

relatively rapid pulse and the almost complete absence of the marked toxaemia

period of apyrexia during which the enlargement of the spleen progresses. Appetite is usually not much impaired but there is an increasing degree of anaemia and emaciation. The hair becomes dull and dry and may fall out. Accompanying the anaemia there is a marked leucopenia. In the later stages emaciation is extreme and the abdomen protrudes markedly, owing to the splenic enlargement often accompanied by ascites.

Laboratory Investigations

1 *The aldehyde or formal gel test*—To 1 cc. of patient's serum in a Durham's or similar tube 1 drop of formalin (40 per cent formaldehyde) is added and the two liquids are mixed by shaking. A positive result is indicated by gelification of the mixture accompanied by a whitish opacity. Gelification unaccompanied by opacity does not constitute a positive result. The change in the mixture is usually evident in a few minutes and should in any case be complete within half an hour.

This test is reliable in developed cases of kala azar but may give a negative result in the first four months of the infection.

2 *Microscopical examination of the peripheral blood*—For this the blood slide must be prepared in a special way. A drop of finger blood is placed

such is the result. The resulting blood smear has a straight edged and rather thick termination. In this straight edge there will be found a great

concentration of leucocytes. The slide is fixed and stained, in the usual way, with Leishman or Giemsa stain. The thick edge is then examined for the presence of Leishman-Donovan bodies inside the leucocytes. These bodies are to be found in the large monocytes and, less commonly, in the polymorphonuclears. In skilled hands this technique gives a positive result in 70-80 per cent. of proved cases of Indian kala azar, but the percentage is said to be less in other types of the disease.

3. *Culture of the peripheral blood.*—About 2-5 cc. of blood, obtained by venepuncture, are added to four times the volume of citrated saline solution (sodium chloride 0.85 per cent., sodium citrate 1.5 per cent.) and the mixture is centrifuged. Alternatively, the mixture may be kept at room temperature or in an incubator at 22°C. for some hours to allow the cells to settle. The deposit consists of red cells and leucocytes, and some of the latter will contain Leishman-Donovan bodies if these are present in the specimen. With a capillary pipette a part of the deposit, especially the more superficial layer containing most of the leucocytes, is aspirated and sown in three or four tubes of NNN medium. These tubes are incubated at 22°-24°C. Flagellated *Leishmania* may be found in them after about 7 days, but they should be kept under observation for three weeks. Eleven or twelve days is the average time for the first detection of flagellates.

In untreated cases of Indian kala azar this technique should give a positive result in well over 90 per cent. of cases. Any examination of the peripheral blood, whether direct microscopic or cultural, is likely to give negative results once specific treatment has commenced, since one of the earliest effects of this is to cause disappearance of parasites from the peripheral circulation. For this reason examination of the blood should be confined to untreated cases.

The method of preparing NNN medium is given below:—

- i. Dissolve by boiling 14 gm. of agar.
6 gm. of sodium chloride.
900 cc. of distilled water.
- ii. Place this, in 4 cc. amounts, in test tubes of 6 in. \times $\frac{3}{4}$ in. Plug with cottonwool and sterilize in an autoclave for 20 minutes at 1½ atmospheres.
- iii. Cool the tubes to 50°C. in a waterbath and then add, with aseptic precautions, 15 drops (1 cc.) of whole rabbit's blood to each tube. Roll the tubes to mix the blood and agar.
- iv. Allow to set in an almost horizontal position and, when quite solid, cap with deep rubber caps.
- v. Incubate overnight at 37°C to test for sterility and at the same time to express the water of condensation.
- vi. Inseminate into the water of condensation.
- vii. Incubate at 22°-24°C.

4. *Liver puncture.*—For this purpose a 5 or 10 cc. all-glass syringe is best, but any type of this size can be used. The needle is of the length supplied with such syringes, e.g., 21 or 22 s.w.g. and 35 mm long. It is all-important that the syringe and needle, when used, should be *absolutely dry* as, otherwise, the Leishman-Donovan bodies may be distorted and difficult to recognize. The patient lies on his back with his thorax and upper abdomen exposed. A point for the puncture is selected in the mid-axillary line between the two lowest ribs in this line, and a dab of tincture of iodine applied to this point. The needle of the syringe is placed on the skin in the centre of the coloured area and, with a quick jab, is thrust through the skin only. The patient usually makes some slight movement but can be assured that this slight prick is the worst he has to face. The needle is then quickly thrust fully in, between

the ribs in a direction towards the opposite side of the body and somewhat upwards. As this is done both hands should be in use the left supporting the syringe near the needle and the right ready to withdraw the plunger. This should be done *immediately* the needle is thrust in and the latter should be withdrawn at once along the line of entry. *Do not wait to see the entry of any fluid contents into the syringe*—this is neither necessary nor desirable—in fact the barrel of the syringe contains even a small amount of material the puncture is not a good one. There should be no more material than is contained in the small glass nozzle of the all glass syringe. The contents of the needle are now ejected onto a glass slide and smeared out with another slide as in making an ordinary blood smear. When this is done about 1 cc of sterile citrated saline solution is sucked up into the syringe and the fluid is then shown in 3-4 tubes of NNN medium. The slide is fixed and stained with Leishman's or Giemsa's stain and will usually give the diagnosis at once by disclosing the presence of Leishman Donovan bodies. The cultures are to be incubated at 22°-24°C and should yield a culture of flagellates within 7 days but should be kept under observation for not less than a fortnight. In follow ing this technique the needle probably traverses the lower margin of the pleura but this appears to have no ill effects.

5 *Spleen puncture*—This procedure has been placed after liver puncture only because of the almost universal opinion of the great danger inherent in the operation of spleen puncture. This fear is not easily understandable by those accustomed to use the technique for the diagnosis of kala azar because if it is properly performed the risk of accident would appear to be very small. The author has performed thousands of spleen and liver punctures without, so far as he is aware, any untoward results. The routine procedure is to give 30 grams of calcium lactate the night before and 30 grains again just before the operation but it is at least doubtful if this has any appreciable effect in increasing the coagulability of the blood. If considered necessary coagulability may be tested and the puncture postponed if it is much below normal.

Spleen puncture may be performed on any patient whose spleen projects below the costal margin. In this case an assistant who places one hand on the abdomen over the most convenient part of the project ing spleen. The latter is now supported by an assistant who places one hand on the abdomen of the patient and supports the organ from below its level in the abdomen. The remaining procedures and precautions are exactly the same as those described under liver puncture. The needle in this case being thrust upwards and backwards into the spleen and withdrawn immediately along the same line without any effort to see if material has entered the syringe. The parasites are likely to be more numerous than in the material obtained from the liver and thus is probably the procedure of choice in skilled hands. In untreated cases microscopic examination of the material obtained combined with the results of culture should give a positive result in every case.

6 *Sternal puncture*—Although this has a special place in the study of blood disorders and can be employed in the diagnosis of kala azar it is more unpleasant to the patient than either spleen or liver puncture. Leishmania will usually be found quite easily in the marrow of untreated patients but there are undoubtedly cases in which the parasites are present only in very small numbers in the marrow though they are numerous in the liver and spleen of the same patients. Examination of the bone marrow has one advantage over other methods but this is of little benefit to the patient as it applies only to examinations *post mortem*. After death Leishman Donovan bodies tend to disappear with the decomposition of the body but are often recognizable in the bone marrow after they have disappeared from tissues like the spleen and

liver, which are, perhaps, accessible to bacterial contamination at an earlier stage than the bone marrow. The technique of sternal puncture is simple and the details are given below. Any 10 or 20 cc. syringe with good suction and a short, stout needle is suitable, but it is preferable to use one of the special syringes made for the purpose. These have a stylette and a stop, capable of adjustment, to prevent the needle penetrating too far.

The patient lies on his back with a support under the shoulders and the head thrown back. Any part of the sternum may be punctured, but the lower part of the *manubrium* is probably the site of election. This area is anaesthetized by a local anaesthetic, care being taken to infiltrate the periosteum.

The *thoroughly dry* needle, with stylette, is pushed into the joint between the manubrium and body of the sternum. The butt of the needle is then lowered until nearly parallel with the long axis of the sternum and the point is pushed in an upward direction until it is felt that the outer table of the bone is pierced. A boring movement of the needle may assist penetration. The stylette is now removed and the needle is pushed through the marrow, which is forced into the lumen. This is usually all that is necessary before withdrawing the needle but, if more tissue is required, the *thoroughly dry* syringe may now be attached and suction applied. This always causes pain or, at least, a very unpleasant sensation. The needle is immediately withdrawn and the wound sealed with friar's balsam.

The contents of the needle are now squirted out on to a slide, and further slides are prepared from the material obtained. From the material remaining in the syringe culture tubes are inoculated as described in the case of liver puncture. The slides are stained in Leishman or Giemsa stain, and examined for Leishman-Donovan bodies.

7. *Gland puncture*—This method has been recommended as a reliable procedure for the diagnosis of kala azar in the Anglo-Egyptian Sudan, and has

steadied above the thumb and forefinger of the left hand, and a *dry* sterile No. 16 hypodermic needle thrust into it and allowed to remain *in situ* for a few seconds. A syringe body may be attached to the needle to apply suction, but this is not necessary. The needle is then withdrawn and the contents blown out on to a slide by attaching a syringe body if this has not already been done. The material is smeared out, stained with Leishman or Giemsa stain, and examined for the presence of Leishman-Donovan bodies. As before, culture tubes should also be inoculated.

8. *Complement fixation test*.—Various tests employing the principle of complement fixation have been used by different workers, but none could be considered completely satisfactory until the introduction of the reaction utilizing an antigen prepared from the human tubercle bacillus according to the method of WITEBSKY, KLINGENSTEIN and KUHN (1931). The test, originally devised for the diagnosis of tuberculosis, gave indifferent results in this disease but, curiously enough, has proved of the greatest value in the diagnosis of kala azar.

For the method of preparation and use of the antigen the original papers, to which references are given, should be consulted, but the procedure, in general terms, is as follows. The haemolytic system of method No. 4 of the Wassermann reaction, as laid down by the British Medical Research Committee, is used together with a maximum quantity of the antigen which does not interfere with 1 m.h.d. of complement, and a 1 in 25 to 1 in 100 dilution of serum. To give an idea of the high value of this test a few figures may be quoted. In a series of 434 cases sent for diagnosis SEN GUPTA (1943) obtained

positive reactions in 97 per cent otherwise proved to be cases of kala azar while a large number of controls of all kinds gave negative results

This test has more recently been modified by the use of other acid fast bacilli and the so-called leprosy bacillus of the human tubercle bacillus strains are easily cultivated and

should be considered together with lead to relapse and in such cases even not be achieved has disappeared and in other

respects the patient appears well the question arises should treatment now be stopped?

Here again the only safe criterion is the demonstration that no parasites

of ANN medium as possible

all are negative after this period the presumption of complete cure is strong

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SUMMARY OF RECENT ABSTRACTS *

II YELLOW FEVER

Epidemiology

The Yellow Fever Research Institute at Lagos completed a successful year

town itself appears to have escaped possibly because of the relatively low

observation that for the mouse-protection test animals less than 5 days old could be used and small amounts of virus This makes it possible to detect a higher proportion of healthy positive sera

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin* 1946 v 43 References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed

The significance of varying susceptibility of animals to yellow fever virus and of varying vector efficiency of varieties of *Aedes aegypti* is brought out by experiments in mice and "bush-babies" and in mosquitoes; and the important bearing of inherited characters on susceptibility and invasiveness may be far-reaching.

The Expert Commission on Quarantine of UNRRA in its Third Report (p. 124) has advised the inclusion in the endemic zones of yellow fever certain areas additional to those originally delineated and adopted in December 1944. In Africa, the additional area is the Barotse Province of Northern Rhodesia; and in the Western Hemisphere, alteration of the previously defined areas has been recommended as a result of the occurrence of cases of yellow fever in Venezuela and in the States of Minas Gerais and Goyaz in Brazil. Two maps, reproduced from *Epidemiological Information Bulletin*, illustrate the African and South American areas respectively (pp. 125, 126).

Yellow fever areas are discussed at length by DE PAULA SOUZA (p. 126) with special reference to South America. The Pan-American Sanitary Bureau suggested to the Expert Commission that three classes of areas should be distinguished (1) Endemic areas where cases have occurred and where conditions favour its recurrence, (2) areas where the risk of becoming infected exists; (3) potentially infectible areas where an *Aedes aegypti* index of 0.4 or higher exists. The National Department of Health of Brazil pointed out that modifications were necessary as infected areas in that country varied in character. An *aegypti* index of 0.4 and less is attainable in S. America, but in Africa a goal of 1 per cent. is regarded as a good first step.

No urban outbreak attributable to *A. aegypti* has occurred in America since 1933, though transmission by *Aedes aegypti* has often followed jungle yellow fever in Brazil, Bolivia and Colombia between 1934 and 1938 and once in the Acre territory of Brazil in 1942. Anti-mosquito campaigns are yielding good results; 42,946 of 44,859 localities were completely freed in 1944, and *A. aegypti* has been eradicated from eight States. Shifting of areas still occurs in Colombia and Brazil. In 1945, an outbreak in the States of Goyaz and Minas Gerais, after three years' quiescence, caused 101 deaths in a few months. In July 1945, 18 deaths occurred in Venezuela and 14 in Colombia, and in May there were 6 deaths in Peru and 2 in Bolivia.

ANTUNES and CASTRO (p. 643) describe the endemic yellow fever area in Brazil and point out that the demarcation plan of UNRRA does not distinguish between endemic and epidemic areas.

The Fourth Report of the Expert Commission (p. 1135) modifies somewhat the endemic areas in Brazil, and also excludes from the endemic area in Africa an area 10 kilometres round the town of Asmara in Eritrea, subject to satisfactory monthly *Aedes* indices. At its meeting the Commission also discussed the question of differentiating administratively between endemic and epidemic yellow fever areas, and gave an account of experiments to test the efficacy of anti-yellow fever vaccine made at the Pasteur Institute at Dakar (see below).

DIAZ (p. 213) describes an outbreak of jungle yellow fever in Venezuela in 1944, which occurred in an area close to the Andean range in the States of Barinas, Bolívar and Táchira, near the Colombian border. Formerly, Bolívar had been considered the only endemic yellow fever zone in Venezuela. It is supposed that in the whole area affected, there must have been about 120 cases, with a death rate of 70 per cent. Immediate precautionary measures were taken, and by the end of the year 28,263 vaccinations had been made.

LAURET (p. 437) refers to the Cuyuní Valley outbreak of jungle yellow fever in Venezuela in 1929, after which the disease has been studied with great care, and continuously since the National Service for the Prevention of Yellow Fever in Venezuela was created in 1937. There are now 76 viscerotomy nests

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operating. There are two endemic jungle yellow fever areas in Venezuela both in the basins of the Maracaibo Lake and the Orinoco River. The first is in the Venezuelan Guayana bounded by the Caroni River and the borders of the State of Bolívar with Brazil and British Guayana. This area is where the 1944-45 outbreak centred. The second is in the States of Tachira and Barina. There may be another focus at the northern watershed of the Andes towards Maracaibo Lake.

GAST and BATES (p. 644) compare the seasonal abundance of *Haemagogus capricornis* (the chief vector of yellow fever in eastern Colombia) with the seasonal distribution of human yellow fever in the region of Villavicencio. Briefly it is recorded that in the post dry season increase in yellow fever lags about a month behind the increase in mosquitoes. Human yellow fever remains at a high level throughout the rest of the rainy season even though mosquito populations are declining. The peak of the disease in November and December corresponds to only a slight rise in mosquito population. The high incidence of yellow fever at this time is attributed to the local custom of felling large areas of forest in November and December. The human population is thus in closer contact with the forest in these months than at any other time.

POLAK (p. 264) in addition to making an extended summary of the literature on the epidemiology and control of yellow fever records that protection tests in Surinam indicate that jungle yellow fever exists there.

Aetiology

LACHMERT (p. 644) has studied the susceptibility of marsupials to different strains of yellow fever virus. Seven species were studied which included 335 marsupials mostly caught in areas of Brazil where yellow fever was epidemic. It had been reported previously. Seven different strains of virus were used, mostly two S American strains JZ and OC which had been maintained in *Aethus* monkeys. The results are shown in detailed tables and indicate that there was a varying susceptibility of the animals to the strains used. In particular three species of opossum (*Didelphis marsupialis*, *D. paraguayensis* and *Metachirops opossum*) appeared to be resistant to the strains used on the evidence of tests for circulating virus after inoculation. South American opossums are aplacental animals and the author thinks it unlikely that the young animals in the pouch acquire passive immunity from the mothers.

The same writer with DE CASTRO FERREIRA (p. 33) has isolated the virus on four occasions from wild marmosets *Callithrix penicillata* caught in the neighbourhood of Ilhéus Bahia where jungle yellow fever is endemic. All of them died with gross lesions of yellow fever confirmed by animal experiments and histopathological examination. Examination of a further 1437 marmosets proved negative. This is quoted as being the first isolation of yellow fever virus from naturally infected vertebrates other than man.

WADDELL (p. 214) has fed *A. aegypti* on marmosets or *Cebus* monkeys infected with jungle strains of yellow fever and tested them for virus content by intracerebral inoculation of mice.

The mosquitoes were killed either by chloroform ether potassium cyanide or tobacco smoke and tested for virus content after various intervals.

After death from chloroform most of the virus activity was lost in 30 minutes and was absent in one hour. Virus was recovered from the mosquitoes two hours after death by the other three methods and was still present after 451 that had died of starvation.

Virus was recovered from *Haemagogus equinus* and *H. spraguei* after feeding on infected and 72 hours after they had died spontaneously after feeding on infected.

monkeys. The authors consider ether to be the most satisfactory agent for killing insects to be used for isolating yellow fever virus.

Transmission.

BATES and ROCA-GARCIA (p. 32) record the maintenance of a strain of yellow fever virus through five cycles in the laboratory, using (1) a Colombian strain of virus isolated from a patient who had died of the disease in an area north of Villavicencio, (2) wild-caught *Haemagogus capricorni* as vectors, (3) wild-caught Saimiri monkeys, whose serum had given negative protective tests. The results of intracerebral inoculation of the strain into adult white mice were variable, but 3- and 5-day old mice were very susceptible, as were Saimiri monkeys, 8 out of 10 of which died of acute yellow fever when infected by mosquito bite. Not all the mosquitoes became infected after feeding on infected monkeys, the percentage apparently being dependent on the quantity of virus ingested and the temperature at which the mosquitoes were kept. The extrinsic incubation period for *H. capricorni* was 22 to 24 days at 24° to 27°C. and 13 to 15 days at 30°C.

The authors believe that the relatively high temperature required for infection is obtained by the species frequenting sunny localities in the forest canopy, where temperatures are higher than in the lower strata; also, the habits of the Saimiri monkeys in the Villavicencio area correspond closely with those of *Haemagogus*.

The same authors (p. 328) have carried out similar experiments, employing on this occasion four douroucoulis (*Aotus trivirgatus*) from the Villavicencio area. A local strain of yellow fever virus and the mosquito *H. capricorni* were again employed. All four animals developed acute fatal yellow fever, confirmed by all the usual tests. Virus was transmitted by the bite of *H. capricorni* from Saimiri to douroucoulis, from douroucoulis to douroucoulis, and douroucoulis to Saimiri. It is suggested, on the evidence, that douroucoulis may be important in the epidemiology of yellow fever, as it is said to be the only monkey in certain endemic areas in Colombia.

WADDELL and TAYLOR (p. 33) describe investigations of the cyclic transmission of yellow fever by alternate passage through insect vector and vertebrate host. Three virus strains were used, two Brazilian and one Colombian. Three series of experiments were carried out: (1) feeding *Aedes aegypti* on a marmoset, *Callithrix aurita*, which had been infected with the virus, and subsequently on a normal marmoset. Nine cycles were maintained. All the marmosets became infected and showed virus on the 2nd or 3rd day; 15 of 17 animals died on the 4th to the 8th day. The two which recovered showed virus up to the 4th and 5th days and were immune when tested on the 21st day. (2) Feeding *A. aegypti* on infected Cebus monkeys (*Cebus versutus*). Five cycles were maintained and all the monkeys showed circulating virus, but only one of 13 died. The remainder developed immunity. The concentration of virus in the circulation was low compared with that found in the marmoset. (3) Three cycles were completed with marmosets and *Haemagogus equinus*. Four successful transfers were obtained. In one experiment, three *H. spegazzinii* were able to transmit the virus from an infected to a normal marmoset. The experiments suggest that the virus may be preserved in forest areas by passage through sylvan mosquitoes and monkeys.

HADDOW (p. 255) has studied the biting activities of *Aedes simpsoni*, the vector of human yellow fever in Bwamba County, Uganda, and showed that it is a strictly diurnal species, most active on warm cloudy days. The principal local variety of raiding monkey is *Cercopithecus nictitans impangae* Matschie. About half of those caught were immune to yellow fever and it is suggested that

small rural communities where many contracted malaria. It was discovered that malaria was more widespread in certain parts of the Island than had been suspected. In the second year of the war the military forces in the Island were greatly increased. Among the arrivals were soldiers who had acquired malaria in Albania and Greece; they introduced fresh strains of malaria. The disease spread. Areas which had long been free from malaria became infected. In Messina, where no primary infections had occurred for many years past, fatal cases of pernicious malaria were reported. In 1944, 92 deaths were attributed to malaria in Sicily.

WILSON, D. Bagster. Notes on the Epidemiology of Malaria in the East Africa Command. *East African Med J* 1946 Sept. 23 No. 9 258-72

Tables embody the monthly incidence of malaria during the years 1943 to 1945 in European military units stationed in the following malaria-controlled places: Dar-es Salaam (4° S 37° E), Nairobi (1° S 37° E), Zomba (15° S 35° E). The table summarizes the annual incidence for each month of the year —

Malaria Incidence (Rate per 1 000)—European Military Personnel

	1943	1944	1945*	Peak Months
Dar-es Salaam R A F Army	1 061	596	183	May-June
Mombasa R A F (Port Reitz) Army	325	340	47	June-July
Nairobi	267	459	55	
Moshi	41	59	30	May-June
Lusaka	—	—	285	March-June
Zomba	—	—	344	Jan-March
			724	March-May

*Mepacrine introduced in certain areas

A second series of tables for the same places give the available figures of average house catches of vector *Anopheles* per month at central and peripheral catching stations in the controlled areas during the years 1942 to 1945. Figures for 1945 are given for adjacent uncontrolled areas. The author claims that standard methods have been followed in the recording of anopheline infestation in houses over three or four years. The method was weekly hand catches in selected native houses carried out by means of torches and test tubes the minimum period for a single searcher at each house being 30 minutes.

The following table is an extract from the above series :—

Average House Catches of Vector Anopheles

				Controlled Central Stations			Uncontrolled
				1943	1944	1945	1945
Annual Mean	Dar-es-Salaam ...	...	...	1.17	1.47	0.38	8.50
	Port Reitz (Mombasa) ..	..	..	—	0.10	0.03	13.6
	Nairobi ...	...	...	0.08	0.11	0.03	—
	Moshi ...	..	..	—	—	0.33	1.0
April to July	Dar-es-Salaam ..	..	..	2.55	3.95	0.67	14.2
	Port Reitz (Mombasa) ..	..	..	—	0.37	0.11	17.4
	Nairobi ...	..	...	0.17	0.21	0.04	0.32
	Moshi ...	..	...	—	—	0.80	0.92

The vector mosquitoes are *Anopheles gambiae* and *Anopheles funestus*; in the coastal places over 80 per cent. of catches were *Anopheles gambiae*.

* The author concludes that while anopheline control [detail not referred to] may be very effective in controlling malaria for the greater part of the year, an efficient larval control may fail to check the high seasonal incidence caused by *A. gambiae* in the more intensely malarious parts of East Africa; effective control demands the reduction of *Anopheles* by 99 per cent. in such areas.

Six thousand feet in the Nairobi area is quoted as the critical height above which *A. gambiae* cannot survive in dangerous density.

[Drs. J. G. S. TURNER and G. A. WALTON in their Departmental Report on Malaria in Freetown (8° N. 14° W.), where the vector mosquitoes are *A. gambiae* and *A. melas*, quote the probable incidence of malaria in the army in 1940 to have been 6,000 per 1,000 per annum; the steady and progressive application of modern control measures (including mepacrine in 1944) reduced the incidence to 73 per 1,000 per annum in 1944.]

R. Ford Tredre.

ZAMENLOF, J. Malaria at Kidugala Polish Refugee Camp, Tanganyika. *East African Med. J.* 1946, Oct., v. 23, No. 10, 311-17.

DE BURCA, B. Tropical Zone Malaria associated with an Increase in *P. falciparum* Infections in the Spring Wave. *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 265-7, 1 graph.

"An account is given of a spring wave of malaria occurring in Central India associated with a definite increase in M.T. infections and accompanied by

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YACOB, M. & SWAROOP, S. Malaria and Rainfall in the Punjab. *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 273-84, 1 chart & 2 maps.

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as to facilitate blood examinations

Norman White

WILSON D Bagster. Notes on the Epidemiology of Malaria in the East Africa Command. *East African Med J* 1946 Sept v 23 No 9 258-72

Tables embody the monthly incidence of malaria during the years 1943 to 1945 in European military staffs stationed in the following malaria controlled places: Dar es Salaam (7° S 39° E), Port Reitz at Mombasa (4° S 40° E), Nairobi (1° S 37° E), Moshi (3° S 37° E), Lusaka (15° S 28° E), Zomba (15° S 35° E). They are based on hospital admissions. The following table summarizes the annual rates per 1 000 in those places in which figures were complete for each month of the year —

Malaria Incidence (Rate per 1 000)—European Military Personnel

	1943	1944	1945*	Peak Months
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The author concludes that while anopheline control [detail not referred to] may be very effective in controlling malaria for the greater part of the year, an efficient larval control may fail to check the high seasonal incidence caused by *A. gambiae* in the more intensely malarious parts of East Africa, effective control demands the reduction of *Anopheles* by 99 per cent. in such areas.

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"An account is given of a spring wave of malaria occurring in Central India associated with a definite increase in M.T. infections and accompanied by considerable mortality.

"No investigations were carried out to establish the vector but dissection results immediately north of the area involved indicate that *A. culicifacies* may be responsible. A brief account of a spring wave on the coast of Eritrea occurring in an area where there is no autumnal wave is also given."

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kept in the original water in Moscow. The breeding places in tree-holes represent small shallow water collections which are heavily shaded devoid of vegetation and in which peculiar chemical conditions obtain while the daily variation of temperature is slight. It was natural to expect to find certain peculiarities in the behaviour of animals living under such ecological conditions. The behaviour of the larvae of *A. plumbeus* is compared with that of *A. maculipennis* which the author had previously described. While in the latter species the descent and rise of the larvae is accompanied by gliding in the former species there is no need for rest in view of the shallowness of the water and the movements are accordingly not interrupted by gliding. In connexion with this the hairy covering of *A. plumbeus* is less developed than that of *A. maculipennis*. Since the surface of the water in tree-holes is undisturbed the larvae of *A. plumbeus* do not have to anchor themselves and the morphological adaptation serving this purpose i.e. the hooks of the caudal hairs are consequently rudimentary whereas the larvae of *A. maculipennis* in which the reaction of stereokinesis is pronounced have well developed hooks. The larvae of *A. plumbeus* manifest a strong negative phototaxis and an increased photokinetic reaction.

Immediately on exposure to light the larvae try to escape from it but when the stimulus is prolonged they react by erratic movements irrespective of the source of light. These reactions enable the larvae of *A. plumbeus* to hide in the darkest corners of the tree-hole.

C. A. Hoare

ULITCHOVA A. V. [The Quantitative Evaluation of Anopheles Production in Typical Breeding Places and its Epidemiological Significance] *Vestn. Parazit. & Parazit. Dis.* Moscow, 1946, 15, No. 1, 25-9 [In Russian].

The author describes the results of an assessment of the epidemiological significance in malaria of various types of water-collections. This study was based on a quantitative estimate of the following data: the density of anopheline pupae per hectare, the total anopheline breeding area of water

$$P = \frac{A \cdot S}{Q} \cdot n$$
 in which P =anopheline production of the breeding place, A =mean daily density of pupae per 1 hectare, S =area of each type of water collection, Q =duration of development of pupa (according to Bodenheimer's formula), n =number of days in a month during which observations were made.

swampy pools (mean area 2.2 hectares).

The mosquito output of each type of water-collection varies with the season. In spring the chief breeding places are the swamps which are responsible for

seasons, it is possible to determine the type of water-collection in a given locality which serves as a focus of malaria and is responsible for outbreaks during the second half of the summer.

C. A. Hoare.

ETHERINGTON, D., HICKLING, S., RODEN, A. T. & SELICK, G. Malaria Transmission by Unusual Vectors in Northern Italy. *Riv. di Malariologia*. 1946, Feb., v. 25, No. 1, 1-12.

The observations recorded relate to the psychiatric hospital about two kilometres south-west of the town of Vercelli. The Province of Vercelli is in the western half of the middle Po valley. In the nineteenth century it was highly malarious, but thereafter malaria incidence steadily declined. No case was recorded from 1912 to 1918, and only very few sporadic cases until 1943. In July 1943, cases of malaria began to occur among patients at the psychiatric hospital, who had not received malaria therapy, and among members of the staff. Cases occurred in the two subsequent years: 51 primary cases were reported in August 1945, the highest monthly total during the three years. All the infections were with *P. vivax*. During 1941 and 1942 patients requiring malaria therapy were infected by *A. maculipennis* which had been infected with *P. vivax* at the Rome Institute of Malariology. Thus a reservoir of infection was created. Mosquito screening had fallen into disrepair.

The predominant anopheline in this area is *A. maculipennis* var. *messeae*. *A. m. melanoon* also occurs. *A. hyrcanus* (*pseudopictus*) was as plentiful as *A. maculipennis* in stables in August, but the latter predominated in the hospital buildings. All these mosquitoes are generally considered to be of no importance in the transmission of malaria in Italy, where they are normally zoophilic. Mosquitoes dissected numbered 519. Sporozoites were found in one of 113 *A. hyrcanus* and in 1 of 72 *A. m. messeae* dissected in August 1945.

Norman White.

AKALIN, M. S. Anopheles Makulipenis Varyete Singaref ve Anadolu Makulipenis'leri eihazi tenasülilerinde görülen anomahiler. [Morphological Anomalies in *Anopheles maculipennis*.] *Türkische Ztschr. f. Hyg. u. Exper. Biol.* Ankara. 1941, v. 2, No. 2, 128-38. German summary 139-41, 6 figs.

In Turkey *Anopheles maculipennis* seems to produce anomalous varieties in male genitalia. The parabasal spines in the male genitalia (which should be three) may be any number from one to five, and are frequently different on the two sides of the body. Several types are figured. The commonest has three on each side, but specimens with two on each side made up 13 per cent. [presumably of all males examined]. The paper contains a number of crude figures of eggs, some of them referable to well-known races. To what race the anomalous males belong is not stated in the legends to figures, nor in the brief German summary. [The bulk of the paper is in Turkish. The German translation of the heading of the table contains at least one error.] It may well be that the author has made an interesting discovery.

P. A. Buxton.

VINCKE, I. Note sur la biologie de *Anopheles duren* Edw. [The Biology of *Anopheles duren*.] *Ann. Soc. Belge de Méd. Trop.* 1946, June 30, v. 26, No. 2, 161-74, 2 figs.

The collecting of anophelines near Elizabethville, Belgian Congo, from January 1944 to December 1945, has shown that *Anopheles duren* has a strictly limited range in this area, apparently confined to the trees near its breeding place in the Kisanga river. Repeated searches in huts, houses, stables and the like failed to

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produce this species but in the open among adults of 14 species of *Anopheles* collected *A. durenti* formed 51.78 per cent and *A. implexus* 40.52 per cent. From the nearby river larvae of eleven species were taken 43.03 per cent of which were those of *A. durenti*.

Seven hundred and thirty three females dissected between January 1944 and January 1946 produced a sporozoite index of 7 per cent but during February to April 1946 only four out of 83 examined contained human blood during the same period 23 out of 25 *A. funestus* 10 out of 10 *A. gambiae* and 14 out of 14 *A. implexus* were positive for human blood.

Investigations are continuing in order to identify the *Plasmodium* and to determine whether it is transmitted to man by *A. durenti*. Charts show the distribution of the numbers of trees examined month by month for the two years and the numbers of *A. durenti* collected from them. Charts show the seasonal distribution of the adults and larvae from which the period of greatest prevalence is seen to be from November to March.

H S Leeson

WOLFE J. Sur les anophèles de l'agglomération de Coquilhatville et sur leur rôle respectif dans la transmission du paludisme dans cette agglomération [The *Anopheles* of Coquilhatville and their respective rôles in the local transmission of malaria] Ann Soc Belge de Méd Trop 1945 Dec 31 v. 25 Nos 3/4 225-30

Coquilhatville is on the Equator and is surrounded on the north and north west by the Congo on the north east by the Congo's great tributary the Ruki and on the other sides by tree covered swamp. The banks are high where the rivers join but further up the Ruki the bank is a vast grassy marsh subject to flooding the floods reaching a part of the European settlement. There are numerous islands in both rivers.

Nine species of *Anopheles* were found in Coquilhatville and adjacent villages. he numbers of adults captured in 1944 are indicated) *A. mouchei* 8 000 *A. paludis* 7 000 *A. obscurus* 300 *A. concolor* 40 *A. gambiae* 30 *A. implexus* var *henrardi* 20 *A. nili* 5 *A. constanti* 2 and *A. funestus* 1. It is interesting to note that *A. gambiae* the most prevalent species in the Congo generally here takes only fifth place. *A. mouchei* is widespread in European and native quarters. *A. paludis* and *A. obscurus* are found in greater numbers in the verandahs than in the interior of houses. *A. concolor* was only taken outside houses near the river. *A. gambiae* which is very rare was found in the native city and in two villages. *A. implexus* var *henrardi* is a new variety that was found on tree trunks near the river bank. *A. implexus* type is a mosquito of the high regions of Elisabethville and Ruanda Urundi. It has never been found in the central basin of the Congo. The other three species were so rare as to be negligible.

The capture of larvae showed a curiously dissimilar distribution of species. *A. paludis* was found breeding in great numbers and in most diverse places near the European quarters and elsewhere but the only breeding places of *A. mouchei* found were in islands in the river opposite the port among flooded high grass. The explanation of its great prevalence as an adult remains to be solved. *A. gambiae* was more commonly found in larval than in adult form but only outside the town and even here full grown larvae were rare. A possible explanation is that a stratum of limonite (Bog ore) lies very near the surface and casual collections of water such as those in which *A. gambiae* often breed are commonly covered with a layer of iron looking like a film of oil.

Endemic malaria is much less severe in Coquilhatville than in other large Congo agglomerations. *A. mouchei* is probably the most important local

vector: the author dissected 1,500; the sporozoite index was only 0.86 per cent. *A. paludis* is not a vector as a general rule; only one specimen with sporozoites was found among several hundred dissected. *Norman White.*

MORTIMER, D. A. Notes on the Anopheline Fauna of Manipur Area, Eastern Assam. *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 269-71.

SCHIAVI, A. Nota sobre mosquitos vetores em Iguape. [Note on the Mosquito Vectors in Iguape.] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1945, Sept., v. 10, No. 25, 69-75, 1 map. English summary (5 lines).

The town of Iguape lies in the delta of the Ribeira River. Its southern side is separated from an island, Ilha Comprida, by a strait, Mar Pequeno, some one and a half kilometers wide. The southern shore of the narrow island borders the Atlantic. Iguape suffers from sometimes severe endemic malaria: 8 to 10 per cent. of the population suffer annually, 4 to 7 per cent. from primary infections. The infection rate of females was nearly three times higher than that of males. The author made an incomplete survey in the early months of 1944; January was the month of maximum malaria incidence. He found *A. (N) albitarsis domesticus* to be the most prevalent anopheline and it is considered to be the most important vector. Of 107 adults collected 89 were of that species, 10 *A. intermedius*, 1 *A. oswaldoi*, 1 *A. mediopunctatus*, 2 *A. cruzi* and 4 *A. bellator*. Of 60 *A. albitarsis domesticus* dissected five were found with oöcysts; two of these also had sporozoites. The infection rate was thus 8.3 per cent. This mosquito was very much more prevalent in parts of Iguape bordering the Mar Pequeno than elsewhere and evidence is produced which indicates that the chief breeding grounds are in the Ilha Comprida, one and a half to two kilometers distant. *Norman White.*

RACHOU, R. G. Da domesticidade dos anofelinos do sub-genero *Kerteszia* no litoral do Estado de Santa Catarina. [Domesticity of the Anopheline Sub-Genus *Kerteszia* in Santa Catharina, Brazil.] *Folha Med.* 1946, July 25, v. 27, No. 14, 105-7. [Summary in English by the author.]

"The anophelines of the sub-genus *Kerteszia*, represented by three species—*cruzi*, *bellator* and *homunculus* (?)—had been found naturally infected in several localities of the State of Santa Catharina (south of Brasil), where they invade houses in a very high density. The author gives the result of some observations in this region about domestic habits of these anophelines. In 1944, among 15,265 anophelines captured indoors, 15,205 (99.5 per cent.) were identified as *Kerteszi*as. Thirteen localities had been studied, five of them presented a relative incidence of 100 per cent. of *Kerteszia* in the houses; this incidence had oscillated between 89.1 per cent. and 99.8 per cent. in the others.

"Realizing four captures in a house, of 96 hours each one, the author collected 8,949 specimens of *Kerteszia*. These mosquitoes entered the house at any hour of the day or of the night, more at night than at day-time. During the night their entrance was more active, between mid-night and 6.00 P.M. [sic: ? A.M.] The hour with the highest density of mosquitoes was 5.00-6.00 P.M. [sic: ? A.M.], presenting a median density of 66.94."

RACHOU, R. G. O *Herpetomonas pessoai* Galvão e Coutinho, 1941 parasitando o *A. (K.) cruzi* Dyar e Knab, 1908. [*Herpetomonas pessoai* as a Parasite of *Anopheles (K.) cruzi*.] *Folha Med.* 1946, July 25, v. 27, No. 14, 112. [Summary in English by the author.]

"At Caldas da Imperatriz, Santa Catarina, dissecting 292 anophelines of the species *A. (K.) cruzi*, the author found 8 (2.7 per cent) specimens with their

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... National Bank ...
... 1968 ...

Y.H. 118 to Tully, E. Political Stock in the Profiteers of Africa
 1944 / 1945 / 1946 / 1947 / 1948 / 1949 / 1950 / 1951 / 1952 / 1953 / 1954 / 1955 / 1956 / 1957 / 1958 / 1959 / 1960 / 1961 / 1962 / 1963 / 1964 / 1965 / 1966 / 1967 / 1968 / 1969 / 1970 / 1971 / 1972 / 1973 / 1974 / 1975 / 1976 / 1977 / 1978 / 1979 / 1980 / 1981 / 1982 / 1983 / 1984 / 1985 / 1986 / 1987 / 1988 / 1989 / 1990 / 1991 / 1992 / 1993 / 1994 / 1995 / 1996 / 1997 / 1998 / 1999 / 2000 / 2001 / 2002 / 2003 / 2004 / 2005 / 2006 / 2007 / 2008 / 2009 / 2010 / 2011 / 2012 / 2013 / 2014 / 2015 / 2016 / 2017 / 2018 / 2019 / 2020 / 2021 / 2022 / 2023 / 2024 / 2025 / 2026 / 2027 / 2028 / 2029 / 2030 / 2031 / 2032 / 2033 / 2034 / 2035 / 2036 / 2037 / 2038 / 2039 / 2040 / 2041 / 2042 / 2043 / 2044 / 2045 / 2046 / 2047 / 2048 / 2049 / 2050 / 2051 / 2052 / 2053 / 2054 / 2055 / 2056 / 2057 / 2058 / 2059 / 2060 / 2061 / 2062 / 2063 / 2064 / 2065 / 2066 / 2067 / 2068 / 2069 / 2070 / 2071 / 2072 / 2073 / 2074 / 2075 / 2076 / 2077 / 2078 / 2079 / 2080 / 2081 / 2082 / 2083 / 2084 / 2085 / 2086 / 2087 / 2088 / 2089 / 2090 / 2091 / 2092 / 2093 / 2094 / 2095 / 2096 / 2097 / 2098 / 2099 / 2100 / 2101 / 2102 / 2103 / 2104 / 2105 / 2106 / 2107 / 2108 / 2109 / 2110 / 2111 / 2112 / 2113 / 2114 / 2115 / 2116 / 2117 / 2118 / 2119 / 2120 / 2121 / 2122 / 2123 / 2124 / 2125 / 2126 / 2127 / 2128 / 2129 / 2130 / 2131 / 2132 / 2133 / 2134 / 2135 / 2136 / 2137 / 2138 / 2139 / 2140 / 2141 / 2142 / 2143 / 2144 / 2145 / 2146 / 2147 / 2148 / 2149 / 2150 / 2151 / 2152 / 2153 / 2154 / 2155 / 2156 / 2157 / 2158 / 2159 / 2160 / 2161 / 2162 / 2163 / 2164 / 2165 / 2166 / 2167 / 2168 / 2169 / 2170 / 2171 / 2172 / 2173 / 2174 / 2175 / 2176 / 2177 / 2178 / 2179 / 2180 / 2181 / 2182 / 2183 / 2184 / 2185 / 2186 / 2187 / 2188 / 2189 / 2190 / 2191 / 2192 / 2193 / 2194 / 2195 / 2196 / 2197 / 2198 / 2199 / 2200 / 2201 / 2202 / 2203 / 2204 / 2205 / 2206 / 2207 / 2208 / 2209 / 2210 / 2211 / 2212 / 2213 / 2214 / 2215 / 2216 / 2217 / 2218 / 2219 / 2220 / 2221 / 2222 / 2223 / 2224 / 2225 / 2226 / 2227 / 2228 / 2229 / 2230 / 2231 / 2232 / 2233 / 2234 / 2235 / 2236 / 2237 / 2238 / 2239 / 2240 / 2241 / 2242 / 2243 / 2244 / 2245 / 2246 / 2247 / 2248 / 2249 / 2250 / 2251 / 2252 / 2253 / 2254 / 2255 / 2256 / 2257 / 2258 / 2259 / 2260 / 2261 / 2262 / 2263 / 2264 / 2265 / 2266 / 2267 / 2268 / 2269 / 2270 / 2271 / 2272 / 2273 / 2274 / 2275 / 2276 / 2277 / 2278 / 2279 / 2280 / 2281 / 2282 / 2283 / 2284 / 2285 / 2286 / 2287 / 2288 / 2289 / 2290 / 2291 / 2292 / 2293 / 2294 / 2295 / 2296 / 2297 / 2298 / 2299 / 2300 / 2301 / 2302 / 2303 / 2304 / 2305 / 2306 / 2307 / 2308 / 2309 / 2310 / 2311 / 2312 / 2313 / 2314 / 2315 / 2316 / 2317 / 2318 / 2319 / 2320 / 2321 / 2322 / 2323 / 2324 / 2325 / 2326 / 2327 / 2328 / 2329 / 2330 / 2331 / 2332 / 2333 / 2334 / 2335 / 2336 / 2337 / 2338 / 2339 / 2340 / 2341 / 2342 / 2343 / 2344 / 2345 / 2346 / 2347 / 2348 / 2349 / 2350 / 2351 / 2352 / 2353 / 2354 / 2355 / 2356 / 2357 / 2358 / 2359 / 2360 / 2361 / 2362 / 2363 / 2364 / 2365 / 2366 / 2367 / 2368 / 2369 / 2370 / 2371 / 2372 / 2373 / 2374 / 2375 / 2376 / 2377 / 2378 / 2379 / 2380 / 2381 / 2382 / 2383 / 2384 / 2385 / 2386 / 2387 / 2388 / 2389 / 2390 / 2391 / 2392 / 2393 / 2394 / 2395 / 2396 / 2397 / 2398 / 2399 / 2400 / 2401 / 2402 / 2403 / 2404 / 2405 / 2406 / 2407 / 2408 / 2409 / 2410 / 2411 / 2412 / 2413 / 2414 / 2415 / 2416 / 2417 / 2418 / 2419 / 2420 / 2421 / 2422 / 2423 / 2424 / 2425 / 2426 / 2427 / 2428 / 2429 / 2430 / 2431 / 2432 / 2433 / 2434 / 2435 / 2436 / 2437 / 2438 / 2439 / 2440 / 2441 / 2442 / 2443 / 2444 / 2445 / 2446 / 2447 / 2448 / 2449 / 2450 / 2451 / 2452 / 2453 / 2454 / 2455 / 2456 / 2457 / 2458 / 2459 / 2460 / 2461 / 2462 / 2463 / 2464 / 2465 / 2466 / 2467 / 2468 / 2469 / 2470 / 2471 / 2472 / 2473 / 2474 / 2475 / 2476 / 2477 / 2478 / 2479 / 2480 / 2481 / 2482 / 2483 / 2484 / 2485 / 2486 / 2487 / 2488 / 2489 / 2490 / 2491 / 2492 / 2493 / 2494 / 2495 / 2496 / 2497 / 2498 / 2499 / 2500 / 2501 / 2502 / 2503 / 2504 / 2505 / 2506 / 2507 / 2508 / 2509 / 2510 / 2511 / 2512 / 2513 / 2514 / 2515 / 2516 / 2517 / 2518 / 2519 / 2520 / 2521 / 2522 / 2523 / 2524 / 2525 / 2526 / 2527 / 2528 / 2529 / 2530 / 2531 / 2532 / 2533 / 2534 / 2535 / 2536 / 2537 / 2538 / 2539 / 2540 / 2541 / 2542 / 2543 / 2544 / 2545 / 2546 / 2547 / 2548 / 2549 / 2550 / 2551 / 2552 / 2553 / 2554 / 2555 / 2556 / 2557 / 2558 / 2559 / 2560 / 2561 / 2562 / 2563 / 2564 / 2565 / 2566 / 2567 / 2568 / 2569 / 2570 / 2571 / 2572 / 2573 / 2574 / 2575 / 2576 / 2577 / 2578 / 2579 / 2580 / 2581 / 2582 / 2583 / 2584 / 2585 / 2586 / 2587 / 2588 / 2589 / 2590 / 2591 / 2592 / 2593 / 2594 / 2595 / 2596 / 2597 / 2598 / 2599 / 2600 / 2601 / 2602 / 2603 / 2604 / 2605 / 2606 / 2607 / 2608 / 2609 / 2610 / 2611 / 2612 / 2613 / 2614 / 2615 / 2616 / 2617 / 2618 / 2619 / 2620 / 2621 /

The above cases are the only ones of pericarditis reported in the literature. The clinical features were those of a viral infection. There was no evidence of bacterial infection. All the patients recovered and were discharged. The only complication was administered in two cases. Ectopic in two and in the other.

The essential feature in shock is the disparity between the volume of the circulating blood and the size of the vascular bed. This may be produced by the following factors: Depletion of the volume of the circulating blood, depletion of water and electrolytes by vomiting, and depletion of the volume of the circulating blood by hemorrhage.

[illegible]

1. HESSELBROCK W B, MARSH A, LUTHERBROOK I D. Hesselbrock W B
 2. PROSSER W W & GORDON H H. Liver Function Tests in Neurosyphilitic
 3. Patients with Induced Virex Malaria of Pacific and Mediterranean Origin.
 4. Med. 1946 Sept 31 No 9 991-8

TITCHELL & W. MARBLE, A. J. LITTLE
 FRANCIS & W. W. GORDON, H. H. Liver Function and Medicine
 Patients with Induced Vivax Malaria of Pacific and Mediterranean
 J. Lab. & Clin. Med. 1916 Sept. 31 No 9 991-8
 The investigation deals with liver function tests in 138 neurosyphilitic
 patients who had previously received a course of drug treatment and none of
 whom had any evidence of hepatic disease. Complete tests were made on a
 number of these patients previous to during and after malarial fever caused
 by infection with *P. vivax* of Mediterranean or Pacific origin through blood or
 sporozoite inoculation. Quinine (atberin mepacrine) was used to terminate
 the fever after 8 to 14 pyrexias when approximately three weeks of para
 athenial fever had been experienced. The authors methods have been given previously
 (this Bull. Jan 1916 43 523). It was then shown that only mild transient
 disturbances of liver function resulted from natural infections with *P. vivax*
 from the Pacific. Studies on similar lines to the present have been reviewed in
 this Bull. Jan 1916 43 523. 1915 42 341 1946 43 97 and very
 recently those of the present authors found that abnormal values pre-
 dominated during the period of fever. Normal results were obtained in the
 ketolose tolerance tests and those for the intravenous hippuric acid test
 were abnormal in only a small percentage of patients. During fever and for a

short time thereafter the values for icterus index, serum bilirubin and urinary urobilinogen were increased in some patients. These laboratory tests were correlated with clinical findings, and hepatic enlargement, accompanied in some cases by tenderness of the organ, was noted in a large percentage of patients. A prominent feature was nausea and vomiting, and a small percentage of patients had jaundice with signs of acute hepatitis. The general conclusion of the authors was that while some liver dysfunction was apparent during malarial therapy in the majority of patients, in the two months following termination of fever by quinacrine the organ functioned in the same way as before therapy was started.

J. D. Fulton.

ARIETI, S. Histopathologic Changes in Cerebral Malaria and their relation to Psychotic Sequels. *Arch Neurology & Psychiatry*. 1946, July, v. 56, No. 1, 79-104, 11 figs. (1 coloured). [Refs. in footnotes.]

GLENN, P. M., KAPLAN, L. I., READ, H. S. & BECKER, F. T. Clinical and Laboratory Studies of Liver Function in Therapeutic Malaria. *Amer. J. Med. Sci.* 1946, Aug., v. 212, No. 2, 197-206.

Earlier studies on liver function in malaria have been reviewed in this *Bulletin*, 1943, v. 40, 582, 1945, v. 42, 341; 1946, v. 43, 97. The authors' interest in the subject was aroused by the occurrence of jaundice in neurosyphilitic patients undergoing malaria therapy, and the value of certain diets in hepatitis has now been investigated by them. The patients, sixty in all, were soldiers, mostly young and in good health, who had been receiving mapharsen and bismuth treatment for some months. The skins of some were still slightly coloured from the use of suppressive atebirin when the experiments began. Clinical and laboratory observations were made previous to infection with *P. vivax* or *P. malariae* and subsequently until discharge; they included estimations of haemoglobin, icterus indices, plasma proteins, urinary urobilinogen and hippuric acid excretion, cephalin-cholesterol flocculation tests, prothrombin times and van den Bergh reactions.

The patients were divided into three groups at random, 15 in each group being infected with *P. vivax* and five with *P. malariae*. Negro patients were infected only with the latter. One group received routine treatment only, while a second group was given extra protein and tablets containing vitamins A, members of the B group, C and D, together with injections of liver extract. The diet of the third group was similar to that of the second, but intravenous glucose containing ascorbic acid and thiamin was given in addition. Detailed clinical records were made of all patients. The malaria in the second and third groups appeared to be more severe than in the first, as judged by the usual criteria. Complications, apart from liver upset, were approximately equal in all three groups. The slight scleral jaundice noted in each group was not correlated with the presence of palpable livers, and judged by this criterion there was least involvement of this organ in the third group. Digestive symptoms, which were most pronounced in the first group, also appeared to be unconnected with liver enlargement. The administration of atebirin and mapharsen at the end of each course of treatment caused enlargement of this organ. The values of the

Estimation of plasma proteins showed the usual decrease at the time of fever, with alteration in albumin/globulin ratios, which soon returned to normal in all three groups. Hippuric acid excretion was also similar in the three groups and was lowered when atebirin and mapharsen were given. Judged by the

STEVENS, A. L. B. & BLACKMAN, G. G. B. Benign Tertian Malaria in England. [Correspondence.] *Brit. Med. J.* 1946, Oct. 26, 625.

This letter reports two cases of benign tertian malaria in persons who had never been abroad, and who, it is believed, contracted the infection in Oxford. Both patients lived within 60 yards of each other, near a slow-flowing branch of the Thames.

The first patient, a girl of 17, suffered from intermittent daily pyrexia for over a month, when trophozoites of *P. vivax* were found in her blood. She showed definite cycles of chills and shivering followed by heat and sweating. Other fevers were excluded by routine tests. Her symptoms were rapidly relieved by quinine. Her brother had been treated for a proved relapse of benign tertian malaria, acquired in Burma, whilst on leave in Britain in April 1946, after which he returned to his unit. After demobilization, he had lived at home since June 3rd, but had no further symptoms.

The second patient, a man of 47, had only left Oxford once in the last nine years. He suffered from fever nightly for about a fortnight, when a positive blood film was obtained. Antimalarial treatment relieved his symptoms. At the time of onset, he was convalescent from an attack of pneumonia which had begun about 19 days before the present febrile attack.

[This record should serve as a further warning to practitioners in Britain to bear in mind the possible need for examining blood films for malaria parasites in the case of all persons suffering from fevers of uncertain origin, irrespective of whether the patients had been abroad or not.]

H. J. O'D. Burke-Gaffney.

SHUTE, P. G. Latency and Long-Term Relapses in Benign Tertian Malaria. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1946, Oct., v. 40, No. 2, 189-200.

The author uses the phrase "a latent attack of malaria" to denote an attack of fever, with parasites, in a patient who had been infected several months before the development of clinical symptoms. Latent attacks of *P. vivax* malaria may occur under natural conditions, or as a result of drug prophylaxis, or in the presence of mixed concurrent infections (*P. falciparum* malaria developing in about 10 days, *P. vivax* malaria many months later), or when patients retaining an immunity to one strain of *P. vivax* are infected with another strain.

Interesting evidence is produced indicating that the number of sporozoites injected, in part at least, determines latency. It does not occur when the number is large; true latency only occurs when the number of sporozoites is too few to cause an immediate attack. The prolonged incubation period varies between 2 months and a year, frequently about 38 weeks. First relapses frequently occur after a similar interval.

It is suggested that relapses in *P. vivax* malaria are due to a resting phase of the parasite and that a drug which could prevent relapse would be a successful causal prophylactic. The author has shown that sporozoites may survive for many months in the tissue cells of the insect host and suggests that they may be able to do so in the human host.

Norman White.

HILLS, A. G. Malarial Jaundice. *Amer. J. Med. Sci.* 1946, July, v. 212, No. 1, 45-53. [13 refs.]

Of 8,837 patients suffering from malaria treated in a United States General Hospital in Assam only 24 (0.27 per cent.) had "malarial jaundice". All were soldiers of the American or Chinese Army. Five of the 24 were *P. vivax* infections, the remainder *P. falciparum*. Jaundice did not occur in 100 cases of *P. malariae* infection. The three fatal cases were *P. falciparum* cerebral

infections. The average day of onset of the jaundice was the 4th day of fever (varying from the 1st to the 7th day) its average duration was 7 days (2 to 15 days). The average maximum van den Bergh reading in 10 patients was 2.4 mg per 100 cc. In the other 14 patients the average maximum icteric index was 27. In 6 patients haemoglobin determinations showed that definite blood destruction accompanied the rising serum bilirubin that is to say the jaundice was definitely haemolytic. Three patients passed free haemoglobin in the urine two of them developed acute azotaemia (BUN determinations 105 and 113). There was no indication that either quinine or atabrine played any part in the production of jaundice.

The conclusion is reached that haemoglobinuria will appear in malaria jaundice when the usual haemolytic mechanism present in the disease becomes so intense and acute that the reticulo-endothelial system is unable to keep the plasma haemoglobin level below the renal threshold.

The relationship of malarial jaundice to blackwater fever is discussed.

Norman H Hite

SHRAGER J & KEAN B H. Purpura as a Complication of Malaria. *Amer J Med Sci* 1946 July, 212 No 1 54-9 [17 refs].

Among 10 000 consecutive cases of malaria treated in the Gorgas Hospital Panama there were only ten complicated by purpura. One patient who had

atabrine. Six of the 9 patients had *P. vivax* infections, 3 *P. falciparum*. Purpura tract skin conjunctiva and eye complication was a serious one other with a *ritax* infection.

reaction

MARK W. Surgery and the Relapse Rate of Malaria. *Brit Med J* 1946 July 27 114-17.

Records published in this paper indicate that the risk of activating latent malaria attendant upon surgical operations has been somewhat over emphasized. One hundred and seventy six operations were performed on 153 patients with a pre operation history of malaria but who had received no suppressive malaria therapy either before or after operation. In only 10 per cent of these cases was there a post-operation attack of malarial fever. Some of these attacks may not have been relapses. The hospital was in an endemic area. The relapse rate was no greater after a major than after a minor operation. For this purpose a minor operation is one that was done in less than 20 minutes. The use of local anaesthetics containing adrenaline was followed by a higher proportion of attacks of fever than was the use of other forms of anaesthesia. Post operation relapses were predominantly due to *P. vivax*.

A further series of 147 operations were performed on patients who had received and completed suppressive treatment before operation. The rate of post-operation attacks of malaria in this group was not significantly different from that in the first.

One thousand nine hundred surgical cases were seen in a forward hospital. The battles had taken place in hyperendemic country. All these patients had

been taking suppressive mepacrine, 0.1 gm. daily, and this was continued during the evacuation stages and during the stay in hospital. Only two cases of post-operation malaria were seen, and in both cases there was reason to believe that the patients had evaded taking the daily dose of mepacrine.

Norman White.

LISITSA, F. M. [Neurological Symptoms of Comatose Malaria.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 1, 44-50. [In Russian.]

The author emphasizes the importance of a differential diagnosis of the nervous symptoms in malignant tertian malaria, and discusses the symptomatology of comatose malaria on the basis of literary data and personal observations. It is pointed out that in endemic areas of malaria, care should be exercised in distinguishing malarial coma from similar conditions of non-malarial origin, though in suspicious cases, where there is some doubt, anti-malarial treatment should not be delayed. Although disturbances of consciousness represent the most characteristic symptom of comatose malaria, they cannot alone serve for early diagnosis and prognosis. In characteristic cases of coma there are other peculiar changes in the neurological signs, *viz.* disturbances of muscular tone, tonic labyrinthine ocular reflexes and other disturbances of . . . and disturbance . . . comatose malar

fusion of blood plasma as a useful supplementary measure. In cases with a tendency for convulsions, injection of camphor is contraindicated.

C. A. Hoare.

DELL, J. M., Jr. & KLINEFELTER, H. F., Jr. Roentgen Studies of the Spleen. *Amer. J. Med. Sci.* 1946, Apr., v. 211, No. 4, 437-42, 6 figs.

The studies reported were carried out with the object of finding an objective and accurate method for determining the size of the spleen. Some enlarged spleens are not palpable and some palpable spleens are not enlarged.

In a U.S. Army General Hospital, the spleens of 300 patients were X-rayed. Half of these had either palpable spleens or were suffering from diseases which might cause splenic enlargement. Postero-anterior films were taken before meals. The plates were made in the PA projection, with a Potter-Bucky diaphragm, 100 milliamperes, with a time exposure of 0.5 second, at a target film distance of 36 inches. The kilovoltage, varying with the thickness of the patient, averaged 6 to 8 kv. less than the usual stomach technique. The central ray was directed halfway between the midline and the left lateral chest wall, three finger breadths below the ensiform cartilage.

There is a considerable variation in the size of normal spleens in different persons; in general, the size of the spleen varies with the size of the subject. Any rotation of the spleen will decrease its apparent size, but there is a corresponding increase in density. Density was measured by comparing it with that . . . considered increased if it . . . n was considered enlarged . . . per cent. the size of the

kidney. In most cases the size of the spleen could be definitely and readily determined from the roentgenogram. No diurnal variation in the size of the spleen was noted and no variation in relation to food or moderate activity. There was often a definite decrease in spleen size, 5 to 15 minutes after subcutaneous injection of adrenalin.

Norman White.

Tropical Diseases Bulletin

VOGT E. Et tilfelle av malaria i Oslo [A Case of Malaria in Oslo] Nordisk Med 1946 Nov 8 v 32 No 45 2601 2 [Summary in English by the author]

A case of malaria tertiana in a woman of 55 years townbred and living in Oslo is reported. The woman had never been abroad and there were no clues for incubation with malaria. The first clinical symptoms of the disease were noticed in March 1946 at a time when the anopheles of this country are hibernating. She was therefore believed to have caught the infection in the course of the preceding summer (July-August 1945) when spending her vacation in a neighbourhood where anopheles have been found and where at the time there were carriers of the disease (military troops from malaria districts). The incubation period for this case is thus calculated at 8-9 months. Attention is directed to the fact that an equally long incubation time for malaria has often been observed also in the Netherlands and in Great Britain.

TEASLEY G H. Malaria following Blood Transfusion. Report of Case. Proc Staff Meetings Mayo Clinic 1946 Aug 7 v 21 No 18 289-93 [20 refs]

This report is based on a case in which malaria was transmitted by blood transfusion. It should always be borne in mind that suppressive atabrine therapy gives no guarantee that the patient will not become a carrier of malarial parasites. The appearance of undetermined fever or chills and fever approximately a week after transfusion of blood should lead to a suspicion of the transmission of malaria. Thick blood smears should be made and examined immediately by a competent person. The endemic malarial areas of the world should be known by every physician and blood donors from these areas should not be accepted without thorough investigation. Blood obtained from a suspicious person should be stored for a minimum of eight days before use. At present there is no laboratory test that definitely will exclude all malarial carriers as prospective donors.

VERHEL W C. Plasmodium falciparum Malaria. The Coronary and Myocardial Lesions observed at Autopsy in Two Cases of Acute Fulminating P. falciparum Infection. Arch Pathology 1946 Mar v 41 No 3 290-98 6 figs

An account is given of two patients with P. falciparum infections which ran an extremely rapid course. Death in both cases was typical of cardiac dilatation and collapse. neither was in actual coma. The description of the post mortem findings is illustrated by excellent photomicrographs. Parasites and parasitized red cells are seen adhering to the capillary walls in the myocardium. Only amoeboid forms are lined along the inner surface of the vessels. The endothelial cells of the capillaries are swollen and often contain phagocytosed malarial pigment. The lesions in the heart resemble infarcts. During the time that these occlusions exist the heart must experience anoxaemia proportional to the extent of the area involved. The coronary system of the heart has a poor collateral circulation and it would seem that coronary occlusions producing anoxaemia of the heart may be as important a factor in fatal cases of P. falciparum malaria as the occlusion of cerebral vessels. Norman White

MAYER M M & HEIDELBERGER M. Studies in Human Malaria. V Complement-Fixation Reactions. J Immunology 1946 Sept v 54 No 1 89-102 1 fig [17 refs]

The antigens most frequently used in this study were the crude P. falciparum P. malar and the more highly purified treat antigen (soluble in water).

antigen), all prepared from citrated human blood by methods previously described. In addition a normal human stromata antigen was used. The sera were absorbed with sheep cells and tested at a dilution of 1:10 with four 50 per cent. units of complement. Primary fixation was for 40 minutes at 37°C. In the case of Wassermann positive sera, it was necessary first to absorb the sera with Kahn floccules, since the malarial antigens contained the Wassermann antigen. This antigen was predominantly contained in the plasmodium and only to a limited extent in normal erythrocytic stromata. The specific malarial antibody was distinct from the accompanying Wassermann antibody.

With sera from cases of chronic relapsing vivax malaria, fixation was most often observed with the soluble vivax antigen, the crude vivax antigen being somewhat less reactive. In the majority of the sera which gave good fixation with the crude vivax antigen, equally good fixation was obtained with the normal human stromata antigen. The antibody which reacted with the

stromata antigen rendered the sera anticomplementary. This auto-antibody was quite distinct from the Wassermann antibody. With the soluble vivax antigens, the antibody to the plasmodial component was being measured, whereas with the crude vivax antigens the auto-antibody was mainly being titrated. However, the latter reaction, although immunologically non-specific, was characteristic for malaria as a disease. The sera from these cases of chronic relapsing vivax malaria were also combined with other antigens prepared in similar ways of *Pl. gallinaceum*, *Pl. knowlesi* and of normal chicken and monkey stromata. The monkey stromata antigens were all negative but the other antigens gave fixation similar to the normal human stromata antigens, presumably reacting with the auto-antibody.

The crude *falciparum* antigen reacted with these same sera less strongly than the normal human stromata antigens, because the former was used at a higher dilution. However, with sera from cases of *Pl. falciparum* infection, the *falciparum* antigens reacted strongly where there was no fixation with soluble vivax antigens. Fixation was only obtained with the crude vivax antigens in those cases which because of their auto-antibody also fixed complement with normal human stromata antigens. This indication of a species specificity in the immune response was also noticed with sera from patients infected with either *Pl. falciparum* or *Pl. vivax*, and also with sera from patients who had received formalinized vaccines of these plasmodia.

The authors conclude that as a test for latent malaria the complement fixation reaction with any of the antigens described is of only limited value. If syphilis is excluded a positive reaction either with a malarial antigen or with a preparation of normal human stromata is specific for malaria. But with sera from cases of chronic relapsing vivax malaria, a single examination with the most reactive antigen (soluble vivax antigen) only gave fixation in 40 per cent. of cases. However, by repeatedly testing such patients over 2-3 months the probability of detecting malaria is much greater.

The specific malarial antibody did not appear to be a protective antibody. The auto-antibody possibly indicated a lack of immunity. *Forrest Fulton.*

GORDON, H. H., MARBLE, A., LIPPINCOTT, S. W., HESSELBROCK, W. B. & ELLERBROOK, L. D. Clinical and Laboratory Studies of Relapsing Vivax Malaria of Pacific Origin. *New England J. of Med.* 1946, Apr. 18, v. 234, No. 16, 519-23, 1 fig. [11 refs.]

This is a study of the clinical features and laboratory findings in 808 soldiers admitted to the Malaria Section of the Harmon General Hospital. All the

patients had acquired *P. vivax* infections in the Pacific war areas. *P. falciparum* was only once found in a mixed infection an indication of the efficacy of mepacrine in curing malignant tertian malaria.

Gametocytes were found in 49 per cent of smears taken during 401 attacks but even when treatment was delayed 48 hours after the onset of the attack two or more gametocytes per 100 white cells were found in only 16 per cent of attacks. Prompt treatment quickly eradicates parasites so that if the disease is recognized promptly and treatment started without delay there is very little danger of its transmission by gametocytes. No locally acquired malaria has occurred at this hospital during the eighteen months during which malaria has been treated there.

Acute attacks were relatively mild but the tendency to relapse was very marked. Attacks were treated with quinacrine (mepacrine) 0.2 gm. every six

hours. Completion of treatment. The administration of small doses of mepacrine or of pamaquin had no significant effect on the ultimate rate of relapse though very few relapses occurred when patients were actually taking 0.1 gm. mepacrine a day (only 4 relapses in 163 patients).

The complement fixation test with a *P. gallinaceum* antigen was not of much value in detecting latent malaria between attacks. Sixty-four per cent of 691 tests so performed were negative.

Liver function tests showed no evidence of permanent hepatic dysfunction.
Norman White

CARLSON, H. J., MUELLER, M. G. & BISSELL, H. D. Colorimetric Diagnostic Tests for Malaria. *J. Lab. & Clin. Med.* 1946 June 1, 31, No. 6, 677-86, 3 figs. [12 refs.]

Similar to those of solutions of certain colloidal dyes and that colloidal dyes under certain conditions combine quantitatively with proteins suggest that the use of such dyes might demonstrate the modified characteristics of malaria serum during the acute and chronic phases of the disease. The test evolved is done as follows:—

One cc. of a 0.1 per cent aqueous solution of Congo red is placed in a test

the point of maximum adsorption by the red-orange solution. The optical density of each test solution is read in turn and the values are recorded as directly proportional to the dye left in solution.

Observations were made on monkeys with *P. knowlesi* infections on bird malaria (*P. gallinaceum*) and on human *P. vivax* malaria. By way of illustration

of results the following is given :—Optical densities in monkey O before infection varied from 0.400 to 0.460, over a ten-day period. Three days after infection the reading was 0.420 ; thereafter readings fell steadily to 0.190 on the 16th day of infection. After treatment with atebryn the readings gradually returned to normal

It is possible that this reaction has no specific relationship to a malaria infection, but controls, other than serum from patients with infectious hepatitis or marked anaemia, showed no similar reactions. It, or a modification of it, might be a significant diagnostic aid in malaria. *Norman White.*

FISCHER, H. & ALMASY, F. I. Ueber die Wirkung von Chinin auf die Malaria-Infektion. Ein Beitrag zur Grundlegung cellularer Stoffe. [The Action of Quinine on Malaria. I. The Active Principle.] *Arch. f. Exper. Path. u. Pharm.* 1942/43, v. 200, 455-94, 15 figs. [39 refs.]

FAIRLEY, N. H. The Chemotherapeutic Control of Malaria. *Schweiz. med. Woch.* 1946, v. 76, Nos. 37/38, 925-32. [13 refs.]

The important investigations described here were carried out by the Australian Medical Research Unit at Cairns, Australia, during the late war and were the subject-matter of a lecture given to the British-Swiss Medical Conference at Basle, in September 1946. The author briefly discusses the two different problems of chemotherapeutic control of malaria in non-immune populations as represented by troops in the field and in indigenous populations already possessing some immunity. Observations on this subject by SINTON have been reviewed [this *Bulletin*, 1940, v. 37, 57] and at different times those of other writers. During 1942 and 1943 in the S.W. Pacific area, where malaria was a serious problem amongst troops engaged in jungle warfare, quinine had at the start been chiefly employed as a suppressant but proved unsatisfactory. A Research Unit was therefore set up at Cairns and investigated the suppressive and causal prophylactic action of various drugs. About 850 healthy volunteers were infected with sporozoites during these experiments. The drugs tested were: quinine, plasmoquine, atebryn, certain sulphonamides, paludrine (M4888) and its methyl derivative (M4430) as well as two drugs of the 4-aminoquinoline series, sontochin (SN 6911) and resochin or chloroquine (SN 7618) which were first synthesized in Germany and supplied from America. Some earlier reports on treatment with M4888 and M4430 have been reviewed [this *Bulletin*, 1946, v. 43, 400-402, 527, 628]. Of the above series quinine, atebryn, sulphadiazine, sontochin and resochin had suppressive properties through their action on schizonts. However, by the technique of subinoculating non-immunes with 200 cc. whole blood of a treated donor on the 7th and 9th days respectively after infection with *P. falciparum* and *P. vivax* the presence of viable parasites in the donors' blood was demonstrated. While quinine and sulphonamides proved of little value as suppressants for Army purposes, it was found that with the atebryn, sontochin and resochin the parasites were killed in the blood. The drug was then given through

The above technique of subinoculating whole blood allowed drugs to be classified as schizonticidal suppressants or causal prophylactics. In the latter category was plasmoquine, which in doses too large to be tolerated proved to be a complete causal prophylactic and a partial causal suppressant. The results were reported by JAMES and FAIRLEY in the *Journal of the Royal Society of Medicine*. Paludrine in well-tolerated doses had similar properties, was very active in

the period between relapses. A strike in the small single dose of 100 mgm symptoms in BT and MT infections a bilities of this single dose regimen of paludrine applied to native villages and epidemics in hyperendemic areas open up an entirely new field in the chemo therapeutic control of this disease not only on account of its schizonticidal value but also because of its extraordinary potency as a causal prophylactic. The result of extended field experiments will be eagerly awaited.

J D Fulton

BLACK R — — — — — *Plasmodium falciparum*
(New Key Soc Trop Med &
H)g d figs on 1 pl [10 refs]

In spite of much experimental work no definite evidence has been obtained regarding the mode of action of drugs on malarial parasites. In the present investigations the qualitative action of a number of compounds of widely different chemical constitution has been studied on various New Guinea strains of *P. falciparum* *in vitro*. Infected blood was obtained from volunteers of

amides the amount of drug present was estimated. Samples were withdrawn from the cultures at intervals of 4 to 6 control tubes serum from the donor donors was used. The lethal effect related M4430 was exerted on young schizonts in a similar way to that noted in treated cases of *P. vivax* malaria. Mefrin, sontochin (SN6911), resochin or chloroquine (SN7618) and quinine caused arrest of development and degeneration of merozoites at an earlier stage. In the presence of chloroquine

GORDON H H CHRISTIANSON H B & LIPPINCOTT S W. A Comparison of Quinine and Quinacrine in the Treatment of the Clinical Attacks of Vivax Malaria. *Southern Med J* 1946 Aug 39 No 8 631-4 1 fig

Quinacrine — — — — —

6 to 2.2 gm given during the

subsequent 5 or 6 c.c. of 10 gm. thrice daily for 2 days followed by 0.1 gm. thrice daily. Patient was treated unless his oral temperature fell below 38°C. Parasites were found in the blood. The patients were well nursed and fluids were forced in all cases. Quinacrine cleared the blood of parasites much quicker than did quinine. Both drugs satisfactorily controlled fever. Minor toxic symptoms were much more in evidence with quinine. Quinacrine is the drug of choice in the treatment of vivax relapses and not a mere substitute for quinine. *Norman White.*

READ, H. S., BECKER, F. T. & KAPLAN, L. I. Operation of an Army Neurosyphilis Center. *Bull. U.S. Army Med. Dept.* 1946, July, v. 6, No. 1, 66-71.

This is a brief description of the administration and working of a Neurosyphilis Centre at a U.S. Army General Hospital. During a period of 17 months 636 patients were admitted of whom 373 received malaria therapy. The single fatality in this series of cases was caused by spontaneous rupture of the spleen.

Norman White.

BECKER, E. R., BURKS, C. S. & KALEITA, E. Plasma Atabrine Concentrations attained by Subjects taking 0.1 Gram of the Drug Daily. *J. National Malaria Soc.* Tallahassee, Fla. 1946, June, v. 5, No. 2, 165-8.

"The mean plasma atabrine levels of a group of 14 individuals under observation for 21 weeks commencing 15 February '45 in Assam, India, stabilized within two weeks on a suppressive atabrine regime of 0.1 gm. daily at values ranging from 21.3 G/L to 26.0 G/L. A group of seven others who started at the same time attained somewhat lower means, apparently because this group contained four individuals who might be called 'poor absorbers'. There was considerable variation in the ability of individuals to attain blood levels recognized as satisfactory for suppression. These groups contained no individuals who exhibited extraordinarily high blood levels, but a number of such cases were encountered in the course of other studies and are herewith described."

SMITH, P. K., GALLUP, Barbara N. & CAIN, Louise J. Blood Plasma Atabrine Levels obtained with Suppressive and Therapeutic Doses of Atabrine Dihydrochloride. *J. Pharm. & Exper. Therap.* 1946, Aug., v. 87, No. 4, 360-63, 2 figs.

"1. The blood plasma levels of subjects receiving the same dose of atabrine are extremely variable.

"2. The group average plasma levels obtained are approximately proportional to the dose used.

"3. With constant daily doses four to five weeks are required to reach constant mean plasma levels. Similar plasma levels are reached in two weeks when the dose is doubled during the first week.

"4. With low plasma levels of atabrine a reduction to one-half occurs in 48 hours. With a large dose the reduction is less rapid.

"5. The plasma levels of atabrine do not affect the plasma levels."

LUTTERLOH, C. H. & SHALLENBERGER, P. L. Unusual Pigmentation developing after Prolonged Suppressive Therapy with Quinacrine Hydrochloride. *Arch. Dermat. & Syph.* 1946, Apr., v. 53, No. 4, 349-54, 7 coloured figs. on 1 pl.

The authors have seen eight cases of unusual pigmentation that have followed prolonged administration of mepacrine. Detailed reports of three cases are

given There was blue-grey pigmentation of the nails of fingers and toes. The pigmentation was situated in the nail bed diffuse in most cases but sometimes as a transverse band near the middle of the nail. In one case there was light bluish pigmentation of the tip of the nose and inferior surfaces of the alae and a dark bluish discoloration of the hard palate. Abstinence from mepacrine for four months in one case resulted in marked improvement the abnormal pigmentation had cleared considerably. The blue-grey colour is in striking contrast to the lemon hue of mepacrine staining of the skin. A possible explanation is that the optical scattering phenomenon exhibited by the skin may cause pigment deposited in the corium to assume a grey to blue colour depending on the amount and depth of the pigment. See also this *Bulletin* 1946 v 43 1008]

Norman White

D IGNAZIO C & COLLOMB H Neuro psychoses aigües consécutives à l'administration d'atébriine [Acute Neuro Psychoses following the Administration of Atebrin] *Boll Soc Ital di Med e Igier Trop* (Sez Entrea) 1946 v 6 Nos 1/2 43-51

An account of two cases

JAME L Quelques aspects de la prophylaxie du paludisme en Afrique du Nord au cours de la guerre mondiale [Certain Aspects of Malaria Prophylaxis in North Africa during the World War] *Bull Soc Path Exo* 1946 v 39 Nos 1 2 17 28

During the early years of the world war when the three countries of North Africa were more or less cut off from France there was a growing shortage of antimalarial drugs and of larvicidal substances. The native population suffered accordingly. In Algeria the spleen rate which before 1940 varied between 33 and 38 reached 50 after the epidemic of 1943. Undernourishment was also an important factor in the deterioration of health conditions. Later the reservoir of infection was reinforced by the arrival of large numbers of prisoners of war many of whom notably Italians were heavily infected. Later arrival of large numbers of non immune American and British troops and Frenchmen from France travelling across Spain increased the danger of an epidemic. Prophylactic measures however were successful in large measure in protecting the military forces. Statistical information regarding the incidence of malaria in the civil population is incomplete. Among troops in Morocco malaria increased year by year from 1939 to 1943 there were 6 233 cases in 1943 as compared with 1 364 in 1939. In 1944 there was an abrupt decline. Rainfall was deficient in 1944 and antimalarial measures of many kinds were renewed with materials obtained from American sources. There was a parallel improvement in the civil population. Similar trends in malaria incidence were noted in other parts of North Africa. The paper includes a dissertation on the value of synthetic drugs in the clinical prophylaxis of malaria.

Norman White

UNTER C E W New Conceptions of Malaria Control *Med J Australia* 1946 Apr 13 v 1 No 15 510-11

The author considers malaria control in the light of results achieved with new drugs and new insecticides. Atebrin is passing out of the picture without its military discipline. Atebrin would have failed in the war such discipline impossible in peacetime. Moreover the risk of toxic effects of atebrin are not justifiable in civilian practice. Paludrine will take its place it is a true causal prophylactic of *P falciparum* malaria and a complete

benign tertian fever in a dose of 0.1 gm. twice a week. "A single dose of 0.1 gramme ends an attack of either benign or malignant tertian fever and brings the temperature to normal. This is the end of hospitalization, of malaria cachexia, of malarial abortions, of heavy infantile mortality due to cerebral malaria, of enlarged, easily ruptured spleens and of blackwater fever." All susceptible comers to malarious districts should take 0.1 gm. of paludrine twice a week, but it is preferable that indigenous natives should not have their acquired tolerance interfered with in this way. For them a single dose should be given to control occasional attacks of malaria fever.

Consideration is also given to the extreme value of DDT and "666" in mosquito control, and of di-methyl phthalate as a mosquito repellent.

Norman White.

VAUCEL, M. État actuel du paludisme dans les colonies françaises. [Existing Conditions with regard to Malaria in French Colonies.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 1/2, 29-36.

This paper describes the dominating position that malaria occupies in the nosography of the French colonies and the inadequate measures that, with few exceptions, are taken to diminish its prevalence. It appeals, for the understanding and support of Administrations in a widespread application of modern methods of malaria prophylaxis and control.

Norman White.

MASILLAMANI, S. G. A Paris Green Distributor. *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 263-4, 1 fig. & 1 pl.

NAJERA ANGULO, L. Consideraciones sobre la "*Gambusia Holbrookii*" y método para conseguir la repoblación autobiológica de los ríos. [Considerations concerning *Gambusia holbrooki* and a Method of conserving the *Gambusia* Population in Rivers.] Reprinted from *Rev. Ibérica de Parasit.* Granada. 1945, Oct., v. 5, No. 4, 331-42, 3 figs.

This is a dissertation on the value of *Gambusia holbrooki* as a larvicide in malaria control, the extent of its use in Spain for that purpose, and its adaptability to a large range of temperature and of water salinity. A plea is made for its more extended use in Spain. A description is given of a tank, adjacent to the bank of a river, in which *Gambusia* thrive and breed abundantly.

Norman White.

NAJERA ANGULO, L. A luta anti-larvar: agentes biológicos e recursos similares. [Biological and Naturalistic Antilarval Measures.] *An. Inst. Med. Trop.* Lisbon. 1945, Dec., v. 2, 275-327, 44 figs. (29 on 15 pls.).

This lecture is a comprehensive survey of certain measures of mosquito larval control including drainage, automatic flushing, fascine drainage and the use of *Gambusia*. On the last subject the author's remarks are an amplification of his paper published in the *Revista Iberica de Parasitologia* (see above).

Norman White.

MASILLAMANI, S. G. A Net for catching *Gambusia* Fish from Nurseries, Tanks and Wells. *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 259-61, 1 fig.

WILSON, D. Bagster. Notes on the Use of Spray Killing against Mosquitoes. *East African Med. J.* 1946, May, v. 23, No. 5, 131-9. [14 refs.]

Experience in the spray-killing of adult mosquitos while serving with the army in East Africa has led to conclusions which are set out in this paper. In

[February 1947]

unclosed or partially closed buildings the direct hit is essential and for this the average slitgun as ordinarily used is an ineffective weapon hand atomizers urgently need improvement. Against tropical African vectors *A. gambiae* and *A. funestus* spraying is required daily in the evening. Pyrethrum is at present an essential constituent of an effective spray but some DDT should be added. Military experience gives no grounds for supposing that spray killing alone can do more than effect a very partial reduction in malaria transmission in hyperendemic areas of tropical Africa.

RIBBANDS C R Repellency of Pyrethrum and Lethane Sprays to Mosquitoes
Bull Entom Res 1946 Sept v 37 Pt 2 163 72 Norman White

An account is given of investigations into the repellent effect of certain insecticides used for killing house haunting mosquitoes.

The experiments were conducted in coolie huts in Assam between July and October 1945. Most of the huts had mud walls and thatched roofs they were open at the eaves and there were no windows. Each hut contained two rooms each about 10 feet by 10 feet. The mosquitoes were a mixed population of anophelines and culicines. 75 per cent of the anophelines were *Anopheles minimus* and the rest were mainly *A. taruna* and *A. fluminilis*.

The spraying and catching technique was standardized throughout. Doses of the insecticides averaged 50 cc of 0.1 per cent pyrethrum in kerosene (=0.05 cc pyrethrins) or fifty seconds of aerosol spraying (=0.075 cc pyrethrins) or 25 cc of 10 per cent Lethane 334 in kerosene.

Tabulated results show the extent of repellency by expressing the catch after different intervals as a percentage of the same catch after a five-day interval. When the repellent effect was assumed to be negligible. These results show that the extent and persistence of the repellent effect varied with the insecticide, time of spraying and the intervals between treatments, also that sensitivity to the repellent effect varied with the species and sex of the mosquito.

For example spraying with 0.1 per cent pyrethrum led to a reduction of infestation by fed *A. minimus* by 90 per cent after the first night 60 per cent after the second night and the repellency persisted in diminished degree for at least four days. *A. minimus* was more sensitive than *A. vagus* and males were more sensitive than females. The pyrethrum aerosol produced similar though less marked effects and males were again more sensitive than females. In similar experiments with Lethane though there was some evidence of repellent effect it had worn off by the second night. In other experiments with Lethane which involved repeated catches opposite results were noted. Female *A. minimus* were more sensitive than males and male *A. vagus* were more sensitive than male *A. minimus*.

As an insecticide Lethane gave a quicker knockdown than pyrethrum but where the repellent effect is of no consequence the latter is preferable as it is not so unpleasant as Lethane. The rate of knockdown is even slower with pyrethrum aerosol and the chance of escape is increased. Discovery of an efficient insecticide possessing no residual repellent or masking effect would be a considerable contribution to modern technique.

H S Leeson

BRADLEY G H & FRITZ R F Entomological Evaluation of DDT Residual
Spraying for Malaria Control J National Malaria Soc Tallahassee Fla
1946 June v 5 No 2 141-5

1 Residual deposits of DDT were applied to some 400 000 homes for control of malaria during 1945

"2. Such deposits were highly effective in keeping houses free of resting anopheline mosquitos.

"3. Effectiveness of DDT deposits, as measured by the percentage of sprayed houses found free of live mosquitos, gradually decreased during successive months following application. However, after 4 months, live mosquitos were found in only about eight per cent. of treated houses examined.

"4. There was an apparent reduction of 85 per cent. in the number of *quadrifasciatus* mosquitos which had human blood meals in sprayed areas as compared to unsprayed areas."

KNIPLING, E. F. Recent Developments in the use of DDT and other Mosquito Insecticides and Repellents. *J. National Malaria Soc.* Tallahassee, Fla. 1946, June, v. 5, No. 2, 113-21. [12 refs.]

CAMBOURNAC, F. J. C., SIMÕES, J. M. P. & QUEIROZ, E. J. S. Novo método de combate às larvas de *Anopheles*, nos arrozais, por meio de substâncias do grupo D.D.T. [New Method of destroying Anopheline Larvae in Rice-Fields with DDT Preparations.] *An. Inst. Med. Trop.* Lisbon. 1945, Dec., v. 2, 103-39. [12 refs.] English summary.

The investigations recorded in detail were carried out in a hyperendemic region where the only vector, *A. maculipennis* var. *atroparvus*, breeds extensively in ricefields. Good results were obtained with a 1 per cent. alcoholic solution of DDT, either alone or with the addition of "Molhante" NNE (Geigy) 0.25 cc., and turpentine 0.125 cc., to each 5 cc. The larvicide is mixed with the water at the spot where it enters the irrigated field. The extreme diffusibility of the alcoholic solution makes the distribution of the larvicide automatic. Plots as large as 100 metres long and 20 metres broad were easily

were very lethal to anopheline larvae, and toxicity was pronounced in dilutions up to one in a hundred million.

Norman White.

STAGE, H. H. Species Eradication by means of DDT. *J. National Malaria Soc.* Tallahassee, Fla. 1946, June, v. 5, No. 2, 99-101

BRITISH GUIANA. Report of the Malaria Research Service Medical Department —British Guiana, for the Year 1945 [GIGLIOLI, G., Hon. Govt. Malariologist]. 76 mimeographed pp., 3 diagrams.

During 1945 the Malaria Research Service of British Guiana was mainly concerned with the control of malaria of any importance; a maximum observed life span of 10 days, they take their first blood meals 24 hours after emerging and continue to feed every other night. They are strictly nocturnal in their habits and rarely attack in the open; they feed selectively on man and enter houses in large numbers, resting on walls, furniture and hangings before feeding, and, if undisturbed, remaining in the house for long periods after feeding; they are very susceptible to malaria infection, the infecting meal. These habits make the use of insecticide sprays with procion of DDT, will affect also *Culex* and *Aedes aegypti* the vector of yellow fever, which is a potential danger. The early trials with DDT described in this report have given results of great promise. In villages on the

east coast of Demerara mosquito captures in dwellings that had been sprayed with 5 per cent DDT in kerosene were reduced by upwards of 98 per cent as compared with unsprayed control houses during the nine or ten months that followed the spraying. The reduction in the numbers of *A. darlingi* was greater than that of *C. fatigans* but was remarkable in both. A significant fall in spleen and parasite rates followed the spraying.

A. darlingi has been shown to be a very highly efficient vector of filariasis. These preliminary investigations on DDT are described in detail in an adequate summary is not possible. Further reports will be awaited with much interest. [See also SYMES and HADAWAY this Bulletin 1945 v 42 780]

Norman White

MACDONALD G. Notes on Malaria and its Control for Planters and Miners 1946 Apr 61 pp 11 figs & frontispiece. Published under the Authority of the Ross Institute Industrial Advisory Committee by the Malayan Chamber of Mines (Incorporated) and the Rubber Growers Association (Incorporated). London School of Hygiene and Tropical Medicine (University of London) incorporating the Ross Institute.]

The foreword of this useful booklet states: The object of the notes is to give moderately full information on the method of dissemination of malaria and of the technique of its control in such a form that the planter or miner can institute control himself if he is unable to get specialized advice on how to set about it. That object has been accomplished with noteworthy success. All essential facts have been included and there is nothing redundant. The presentation is clear and the booklet is readable. The notes should be of great value to employers of tropical labour in malaria stricken countries where expert advice and supervision are unavailable—not only in Malaya for which country the notes were primarily intended.

Norman White

SIMMONS S W. Progress in the Development of Malaria Control Techniques. J. National Malaria Soc. Tallahassee Fla. 1946 June v 5 No 2 157-63

HOLLIS M D. Postwar Malaria Control in Continental United States. J. Nat. Malaria Soc. Tallahassee Fla. 1946 June v 5 No 2 95-8

EKZEMPLARSKAYA E V. [Immunity in Experimental Malaria of Monkeys (*Macacus rhesus*)] Med. Parasit. & Parasitic Dis. Moscow 1946 v 15 No 1 50-53 [25 refs] [In Russian]

The author working with macaque monkeys (*Macacus rhesus*) experimentally infected with *Plasmodium vivax* studied certain aspects of immunity in malaria. Reinfection of monkeys suffering from chronic malaria with different strains of *P. vivax* showed that they acquired an immunity only against homologous strains but were fully susceptible to infection with heterologous strains of the same species of parasite. Attempts were made to produce passive immunity by injection of serum of monkeys which had recovered from the disease before or simultaneously with the inoculation of the parasites. The results were all negative although the presence of antibodies of low titre (1:64) during the early days of the infection (6-10th days) was established by agglutination tests. These experiments show that the humoral factor in the defence mechanism against monkey malaria is insignificant as compared with the cellular factor manifested by the phagocytic reaction of the reticulo-endothelial system. The

functional disturbance of this system, brought about by splenectomy, intensifies the infectious process and may even bring about a fatal termination. The
 tion of the reticulo-endothelial system in checking the infection.

C. A. Hoare.

MAJUMDER, D. N. & DAS GUPTA, C. R. Haematological Studies In *Silenus* (*Macacus*) *rhesus*. Part I. The Blood Picture of the Normal Monkey. Part II. Nature of Malarial Anaemia In Monkeys. *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 101-4, 8 graphs & 1945, May, v. 33, No. 1, 161-72, 12 graphs. [16 refs.]

i. In the first paper the authors describe the results of haematological studies on 59 normal *Macacus rhesus*, involving 245 examinations of venous blood drawn from a posterior leg vein into a mixture of ammonium and potassium oxalates. Each sample of blood was examined for haemoglobin, total red cells, cell volume and reticulocytes and in each case the mean corpuscular volume (MCV), the mean corpuscular haemoglobin (MCH) and the mean corpuscular haemoglobin concentration (MCHC) were calculated from the first three data. The technique followed was that described by NAPIER and DAS GUPTA (1942) in their "Haematological Technique". The detailed results are given in a table together with the earlier findings of RAO and RAO (*Indian J. Med. Res.* 1940, v. 27, 1101) and SHUKERS *et al.* [this *Bulletin*, 1939, v. 36, 424]. Apart from the differential leucocyte count the findings are almost identical with those of Shukers *et al.*, who were observing the same species of monkey. The findings of Rao and Rao differed to some extent, but they were using a different monkey, *Macacus sinicus*. As regards the differential leucocyte count, the authors find that of a mean total of 15,380 leucocytes per cmm. a mean of 48.3 per cent. was neutrophils, 47.9 per cent. lymphocytes, 1.61 per cent. monocytes, 2.2 per cent. eosinophils and an occasional basophil.

ii. In the second paper similar haematological studies were made on one monkey which succumbed in four days to a *P. knowlesi* infection, on three suffering from a subacute infection, and on seven with a chronic infection. In the acute infection there was no appreciable change in the blood until more than 1 per cent. of the red cells were infected. The corpuscular constants showed little change until the last stage was reached, when there occurred a sudden upward turn in the MCV curve. Reticulocytes first showed a marked increase towards the end of the infection. The anaemia developed steadily as the parasite density increased beyond the 1 per cent. level. In the subacute infections brought about by regulated doses of quinine, the anaemia, though developing more slowly, was very similar to that seen in the acute infection. In contrast to the acute infection there was a definite tendency to blood regeneration, as shown by the rise in the reticulocyte curve and the presence of normoblasts in the peripheral blood. In general, the corpuscular constants were little altered. In the chronic infections, also produced by suitable doses of quinine, the anaemia developed still more slowly, while there was a marked tendency to blood regeneration. In these animals death generally resulted from complications other than anaemia.

The authors conclude that the anaemia is characteristically normocytic and orthochromic, with a tendency towards macrocytosis at the lower levels of anaemia. The van den Bergh (indirect) reaction is generally negative except in the terminal stages of an infection. There is a varying degree of reticulocytosis which is related to the degree of anaemia present. C. M. Wenyon.

RODHAIN J & LASSMAN P Le comportement en culture suivant la méthode de Bass des plasmodiums de chimpanzee [Behaviour of Chimpanzee Plasmodia in Culture by Bass's Method] Ann Soc Belge de Méd Trop 1944 Sept 30 v 24 No 3 131-45 1 graph 1 text fig & 4 figs on 1 pl

By Row's modification of the technique of Bass the authors have attempted culture of the three malarial parasites of the chimpanzee which resemble the three common parasites of man. The most readily cultivated is *P. reichenowi* which though corresponding closely with *P. falciparum* is no more inoculable to man than *P. falciparum* is to chimpanzees. Schizonts appeared in the culture and liberated their first merozoites in 28 to 31 hours. Later examinations showed that some of these merozoites entered erythrocytes and continued their development to fully formed schizonts and parasites of a third generation. In the case of *P. schueti* and *P. rodhaini* (corresponding to *P. vivax* and *P. malariae*) merozoites could not be followed. In certain tubes employed for culture development up to a first schizogony was noted but growth of the resulting human or baboon serum was used instead of chimpanzee serum. In human serum *P. reichenowi* did not grow satisfactorily but both *P. schueti* and *P. rodhaini* developed as well in these sera as in that of the chimpanzee though it is known that *P. schueti* will not infect the baboon. A culture of *P. falciparum* from man was successful. It appears that the number of merozoites of *P. reichenowi* (8 to 26) is lower than that of *P. falciparum* (20 to 32 according to J G and D Thompson). C M Henyon

BRUYET E & DAO VAN T Essais négatifs de conservation par le froid (-25°C) des schizontes des gamètes et des sporozoïtes de *Plasmodium gallinaceum*. Negative Attempts to preserve *P. gallinaceum* at -25°C Bull Soc Path Exot 1945 v 38 Nos 11/12 323-6

The authors record experiments in which blood and mosquitoes infected with *P. gallinaceum* were rapidly frozen to -25°C and maintained at this temperature for some weeks with the object of testing the survival of the parasites at low temperatures. The survival was tested by bringing the blood or mosquitoes to 37°C and when thawing had taken place inoculating young chicks. In no case however did infection occur. The authors record the negative result in order to save others from wasting their time in a similar fruitless endeavour. C M Henyon

TOYAKI Isabel M The Testing of Drugs against Exoerythrocytic Forms of *P. gallinaceum* in Tissue Culture Brit J Pharmacol 1946 Sept v 1 No 3 163-73 1 fig

In these tests the minced spleens of chickens heavily infected with the tissue phase of *P. gallinaceum* were cultured in a sterile fluid medium consisting of Tyrode's solution chicken serum and embryo extract as described by HAWKING [this Bulletin 1946 v 43 410]. Changes in the pH of the medium which was replaced every 5 to 6 days were indicated by dilute phenol red and a small concentration of penicillin prevented the growth of bacterial contaminants. The drugs for test were dissolved in sterile Ringer's solution at various dilutions before being added to the culture medium. Some reduction of drug concentration resulted from absorption by tissues present. When after 7 to 10 days incubation at 37°C parasite development was satisfactory in the control flasks specimens were withdrawn on coverslips from the experimental flasks and examined after staining. The absence of viable parasites in the flasks containing the drug was confirmed by inoculation of culture material from them into chickens and noting whether infection resulted. Thirteen drugs of varied constitution

were tested by this technique, which is elaborate and in a number of cases proved unsatisfactory on account of the toxicity of the drugs for macronuclei, as well as their insolubility in the medium. Several cultures of *Trypanosoma* were non-toxic to mice and were non-toxic to man. The parasite in the blood of mice was prevented by *p*-aminobenzoic acid. Several developed cultures, an effective exoerythrocytic forms in the chick host. [this Bulletin, 1946, v. 43, 411] on exoerythrocytic forms in the chick host.

J. D. Fulton.

SEELER, A. O. & OTT, W. H. Effect of Deficiencies in Vitamins and in Protein on Avian Malaria. *J. National Malaria Soc.* Tallahassee, Fla. 1946, June, v. 5, No. 2, 123-6, 1 fig.

"Parasite counts in *P. lophurae* infections in well-nourished chicks were less than in infected chicks deficient in biotin, folic acid or protein. On the other hand the parasitemia was less in chicks deficient in riboflavin than in the well nourished chicks. In the case of thiamine, the parasitemia appeared to be lower in chicks receiving approximately the minimal dietary requirements for normal growth than in either severely deficient chicks or in chicks given excess thiamine. Parasitemia in chicks fed a diet of natural foodstuffs was lower than in chicks given purified diets complete in all recognized nutrients."

TRYPANOSOMIASIS.

IKJEJIANI, O. & MAUTNER, L. S. Changes in the Leucocyte Picture in Experimental Trypanosomiasis by Administration of Neostibosan and Neostam. *J. Pharm. & Exper. Therap.* 1946, Aug., v. 87, No. 4, 343-9, 4 figs., [14 refs.]

- "1. In rats which show no resistance to infection with *Trypanosoma equiperdum*, the most characteristic change in the leucocyte picture is a decrease in lymphocyte per-centage, increase in polymorphonuclear neutrophil per-centage and a decrease in monocyte per-centage.
- "2. Rats infected with *T. equiperdum* and treated with neostibosan or neostam showed increased monocyte per-centage, decreased polymorphonuclear neutrophil per-centage and increased lymphocytes, after treatment.
- "3. It is suggested that the increased monocytes play adjunctive role in respect to the drugs (neostibosan and neostam) by completing the destruction of trypanosomes after they have been rendered vulnerable by the drugs."

SCHNITZER, R. J., LAFFERTY, Lillian C. & BUCK, M. The Role of Antibodies in Experimental Drug Resistance of *Trypanosoma equiperdum*. *J. Immunology.* 1946, Sept., v. 54, No. 1, 47-57. [10 refs.]

In order to investigate the rôle of antibodies in the development of drug-resistance by *Trypanosoma equiperdum*, three different methods were adopted for producing resistance. The chemotherapeutic agent used, throughout the work, was pararosaniline hydrochloride (*i.e.* para-fuchsin). This compound exercises a considerably higher activity in infections in rats than in mice. It should, therefore, be especially suitable for the studies in view, since the assumption is that its superior effect in rats is connected with the fact that, as the authors were able to show, these animals exhibit a better immune response

than mice to infections with *T. equiperdum*. Studies in rats may thus be expected to amplify and not merely to duplicate the lessons learnt from studies in mice.

The three methods used for producing resistance were as follows (for technical details and actual dosages etc. the original should be consulted) —

(a) *The relapse method* — This is the classical method of Ehrlich. It consists in the administration of a dose sufficient to remove trypanosomes from the peripheral blood temporarily. When a relapse occurs another dose is given, and so on successive relapses being treated by slightly higher and higher doses as resistance seems to be developing. Since every relapse is preceded by antibody formation the trypanosomes acquiring drug resistance necessarily do so whilst in the presence of large amounts of antibodies.

(b) *The short passage method* — Heavy infections are treated with very small doses and the parasites are transferred to new hosts within the next 4 to 8 hours. Each succeeding passage is carried out in this same manner the dosage being increased step by step. The object is to ensure that the trypanosomes escape the influence of antibodies by passing them before the latter have time to appear.

(c) *Splenectomy method* — Animals are infected the day after splenectomy daily treatment being started within the next 24 hours. Here again the aim is to minimize the influence of antibodies in this case because of their attenuation as a result of the splenectomy.

In mouse infections it was found that resistance developed more readily when the immune response was curtailed e.g. by using the short passage or the splenectomy method instead of the classical relapse method. In rat infections however which are characterized by a more abundant antibody formation the short passage and the splenectomy methods had to be combined in order to obtain resistance consistently within a reasonable time. These findings seemed to indicate that antibodies exercise a definite inhibiting effect on the development of resistance to the compound used. The authors claim further support for this conclusion in experiments which show that passive immunization with trypanocidal antiserum impairs the faculty with which resistance may be produced in mice by the splenectomy method.

The interesting note is added that a similar phenomenon has been observed with pneumococci. A strain of these bacteria could ordinarily acquire resistance to sulphapyridine *in vivo* quite easily but no such resistance developed if the compound was administered in conjunction with subeffective doses of type specific antiserum.

E. M. Lourie

LEVADITI C & VAISMAN A. Transformation de l'atoxyl en trypanotoxyl
[Transformation of Atoxyl into Trypanotoxyl] *Bull. Soc. Path. Exot.*
1946, 39 Nos 7-8 276-83

It is now nearly 40 years since the senior author first wrote on this subject. Together with YAMANOUCHI he showed that atoxyl, which is practically non trypanocidal *in vitro* can be rendered highly trypanocidal by contact with extracts of liver and other tissues (LEVADITI & YAMANOUCHI *C. R. Soc. Biol.* 1909, 65 23). Activation of atoxyl by these means was described as being due to the transformation of that substance into what the authors designated as trypanotoxyl which they believed to be a reduced form of atoxyl in combination with protein.

Quite recently DUREL and RATNER (*C. R. Soc. Biol.* 1944, 138 402) have reported inability to confirm this early work. Extracts of fresh liver, and especially of liver which had been kept at room temperature or at 37°C did not activate atoxyl but were found to be possessed of trypanocidal properties.

on their own account. Levaditi and Vaisman decided, therefore, to re-examine the subject. They have confirmed the original observation that fresh rabbit liver extract, which alone is harmless to trypanosomes (*T. equiperdum*), does in fact render atoxyl trypanocidal *in vitro*. This property is retained for 14 days by extracts from livers kept at $-20^{\circ}\text{C}.$, and for 2 to 4 days by extracts from livers kept at $4^{\circ}\text{C}.$ In the absence of atoxyl, such preparations exhibit no trypanocidal properties up to the observation periods of 14 days and 7 days, respectively. However, livers kept at room-temperature ($20^{\circ}\text{C}.$) acquire

the potency of this
tit of observation.
ne to activation of

atoxyl, when extracts prepared from such livers, after keeping at $20^{\circ}\text{C}.$ for periods up to four days, are brought into contact with the drug. The liver autolysis proceeds either under sterile conditions, or with the appearance of bacteria, in particular a *Pasteurella*, and the authors have found that not only this organism but also *Bact. coli* and staphylococci are capable of lysing trypanosomes *in vitro* at $37^{\circ}\text{C}.$ The authors therefore explain Durel and Ratner's results by supposing that they worked not with fresh livers but with preparations which had already autolysed, either in the absence or in the presence of bacteria.

somewhat more thermolabile
the former are destroyed,
ng to $100^{\circ}\text{C}.$ for 30 minutes.

Three reducing substances were tested for atoxyl-activating properties, and two, namely glutathione [see this *Bulletin*, 1929, v. 26, 579] and cysteine, were active, whilst the third, ascorbic acid, was not. Hydrogen peroxide also was inactive in this respect.

E. M. Lourie.

TORREALBA, J. F. Investigaciones sobre Enfermedad de Chagas en Zaraza (Estado Guárico, Venezuela). Otras Notas Científicas. Recopilación. [Studies in Chagas's Disease in Zaraza, Guárico State, Venezuela, and other Collected Papers.] Fascículo 1°. 1943. 168 pp., 17 figs. Caracas: Litografía del Comercio & Fascículo 2°. 1946. 256 pp., 33 figs. Caracas: Tipografía Garrido.

In these two volumes Dr. Torrealba has collected together his papers on various subjects published during the decade 1932-1942. Most of them deal with Chagas's disease and all have been published before, most of them are already known to readers of this *Bulletin*; in short, they form a collection of reprints. Of most of them Dr. Torrealba was the sole author, but a few have been the result of collaboration. A list is given of those making up the first volume, but there is none of the second group. This is a pity because it is tedious to wade through 250 odd pages to look for some point which has escaped one's memory. It is difficult to say exactly what niche these volumes will fill, or what purposes they are designed to serve, except as a record of much once useful work gathered from various sources, or as a kindly gesture for the author to give his friends.

In the first volume are 11 papers on Chagas's disease, dealing with the clinical, diagnostic and therapeutic aspects; also one on leprosy in Zaraza in 1936; others on parasitology (1932), psychiatry (1924), obstetrics (1937) and dealing
omidae
these,
too, are listed, together with the names of those who first reported their discovery; 7 others experimentally infectable are named and a list is given of ten

species found in Venezuela " " " " "
rubrofasciata *Eitratoma* *ma*
Panstrongylus geniculatus *I*
prolixus

Other papers include one of brief remarks on some studies carried out on pathological specimens collected in 1943—bloods for *T. cruzi* and malaria snails (mainly *A. glabratus*) depicted on 4 plates and spleen pulp specimens. Another contribution consists of brief notes of 60 cases seen in a malaria outbreak in Zaraza in 1941. 18 were *P. vivax* infections, 36 *P. falciparum*, 3 *P. malariae*, one a mixed *P. vivax* and *P. falciparum* and two not decided. Another paper is concerned with the clinical forms of cancer in Zaraza and there is one reprinted from *Gaceta Médica de Caracas* 1943 on the medical zoology of the district.

From the above account it is clear that the book is mainly of local interest and that the material here were published has with this Bulletin. Any way these two volumes constitute a record of much good work done.
 H. Harold Scott

LEISHMANIASIS

MALAMOS B. Leishmaniasis in Greece. *Proc. Roy. Soc. Med.* 1946 Oct. v. 39, No. 12, 799-801, 7 figs.

See this Bulletin 1947 v. 44, 1.

PEREIRA C. & MEDINA H. Viragem da coloração por uma laca ferrea da

Argmos Inst. Biológico São Paulo 1945 v. 16, 41-8, 2 figs. on 1 pl. [12 refs.] English summary.

After trying many techniques for the study of *Leishmania* in the tissues the following is proposed:

Staining solutions

1. Ferric chloride U.S.P. XII solution aqueous dilution to 10 per cent
2. Picric acid saturated solution in 75-76 per cent ethyl alcohol
3. Sodium thiosulphate aqueous solution 2 per cent
4. Hematein solution hematein 10 per cent in alcohol glycerin mixture—10 ml 95-96 per cent alcohol—60 ml 1 per cent ammoniacal solution—20 ml tannin 20 per cent aqueous solution—10 ml

5. Ammoniacal silver to a 10 per cent aqueous solution of silver nitrate add ammonia drop by drop shaking well until the precipitate is just dissolved dilute the solution to 0.5 per cent silver nitrate.

Method of staining

1. Mordant sections in the ferric chloride 1 minute or longer
2. Stain in the hematein on the slide 3 minutes or longer
3. Rinse in water and differentiate in the alcoholic picric acid 0.5 minute or longer
4. Rinse in water and tone on the slide in the ammoniacal silver solution 5 minutes or longer
5. Rinse in water and fix in the sodium thiosulphate solution 1 minute or longer
6. Wash in water dehydrate clear and mount in balsam

"Results.—Chromatin, nucleoli, centrioles, kinetic apparatus of the flagellates and certain parts of striated muscle fibres are stained black; cytoplasm greyish; red blood cells bluish. The Leishmania are easily visible with the high dry power and sharply defined with the oil immersion lens."

DHARMENDRA, BOSE, R. & SEN GUPTA, P. C. The Preparation of an Antigen from the Kedrowsky's Bacillus for the Complement-Fixation Test for Kala-Azar. *Indian J. Med. Res.* 1946, May, v. 34, No. 1, 1-2.

In an earlier paper [this *Bulletin*, 1941, v. 38, 702] the authors pointed out that for the preparation of the W.K.K. antigen for the complement fixation test in kala azar, in place of tubercle bacilli, other and more readily cultivated acid-fast bacilli, such as that of Kedrowsky, could be used. In the present paper details of the method of preparation of the antigen are given.

The growth from a three weeks' culture of Kedrowsky's bacillus on glycerin broth is filtered off and washed on the filter paper with distilled water and rectified spirit. The residue is dried *in vacuo* in a desiccator. The dried product is extracted with 90 per cent. alcohol for three hours in a flask fitted with a reflux condenser over a water bath, filtered free from alcohol and again dried *in vacuo*. The dried alcohol-insoluble residue is then extracted with pyridine

antigen is dissolved in 10 cc. benzol and to it is added the residue obtained by evaporating to dryness 5 cc. of a 1 per cent. solution of lecithin. This is the lecithinized benzolic solution of the antigen which is used in the test. It is kept in the incubator at 37°C. for 10 to 15 days before use. C. M. Wenyon.

BOSE, B. C., IYENGAR, N. K. & MUKERJI, B. On the Assay of Urea Stibamine. *Indian J. Med. Res.* 1945, May, v. 33, No. 1, 151-6, 2 graphs [10 refs.]

As the antimony content of different batches of urea stibamine varies considerably, and, as GRAY and others have pointed out, the drug is not a compound of uniform formula, it is difficult to set up a standard in order to control the various preparations issued for clinical use. However, the authors have attempted to do this by selecting a batch (No 0596) manufactured at the Brahmachari Institute in Calcutta as a temporary standard. They have determined its chemical composition and worked out in white mice a dose-response curve. The LD₅₀ figure was found to be 215 mgm./kgm. for white mice of 18 to 20 gm. weight. It is suggested that a maximum variation of ± 30 per cent. on this figure be permitted. Solutions of urea stibamine are much more stable than organic arsenicals, so that it is unnecessary to take the elaborate precautions in the preparation of solutions, which the arsenicals require. As the relationship of total antimony content of urea stibamine to its toxicity is unknown, and as there is no indication which fraction of the drug is therapeutically active, for the present the assay of preparations of the drug must be carried out by biological methods. C. M. Wenyon.

HO, E. A. Treatment of Kala Azar by Small Dosage of Ureastibamine. *Chinese Med. J.* (Chengtu Edition.) 1944, Oct., v. 63A, No. 1, 7-11.

With a view to avoiding the toxic symptoms which not infrequently result from the treatment of kala azar with urea stibamine, the authors have investigated the possibility of employing smaller doses than is customary. It was

Neill Mooser reaction and Mooser's cells the brilliance of his discoveries needs no enhancement by painting the prevailing ignorance in 1929 of the cause and relationships of classical typhus in unduly sombre colours

John W D Megaw

LEMIERRE Note on Localised Epidemics of Exanthematic Typhus amongst Prisoners of War in France *Bull Office Internat d Hyg Publique* 1946 Apr May June v 38 Nos 4 5 & 6 259-63

During the months of August and September 1945 no cases of typhus fever were detected in France but in October and November outbreaks occurred among German prisoners of war (1) in the Bordeaux area where 195 proved cases with 47 deaths occurred and (2) in the Marseilles area where there were 33 cases with 2 deaths. Only a few cases occurred among the camp guards and French civilians who came into contact with the patients. Both outbreaks were promptly controlled by isolation vaccination and disinfection.

In the absence of any evidence of a recent influx of infected persons the outbreaks are regarded as a local reappearance of the disease among persons of low resistance

John W D Megaw

BULL OFFICE INTERNAT D HYG PUBLIQUE 1946 Apr May June v 38 Nos 4 5 & 6 253-4 Exanthematic Typhus in Tunisia from 1939 to 1946

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The lowest monthly incidence in each year was in September or October

[The natural tendency of epidemics to wax and wane is not mentioned]

John W D Megaw

PADILLA B E Las rickettsiasis en Guatemala [Rickettsial Disease in Guatemala] *Bol Oficina Sanitaria Panamericana* 1946 June v 25 No 6 519-24 1 map & 2 charts [Summary in English by the author]

With the results of more than a thousand complement fixation tests in which epidemic and murine antigens prepared by the Army Medical School

ioned cases. No cross
A positive complement
typhus 30 years before

For any investigations of rickettsial infection it seems essential to combine use of the Weil Felix and the complement fixation tests. The development of both reactions is almost simultaneous during the first week in which the symptoms appear. Several tables and one map are included to show the distribution incidence and mortality of typhus in Guatemala in 1934-1944

HEIDE, E. A. Der mikroskopische Nachweis der Rickettsia Prowazeki im Blutausschlag von Fleckfieberkranken. [Microscopical Demonstration of *Rickettsia prowazeki* in Blood Smears from Typhus Patients.] *Zent. f. Bakt.* I. Abt. Orig. 1944, July 12, v. 151, No. 6, 289-93, 5 figs.

Stained blood smears of about 200 patients were examined on the 10th to the 12th day of severe attacks of louse-borne typhus fever; in eight of these, bodies were found which had all the appearances of rickettsiae.

In most of the cases the bodies were bacilliform, but in one they were coccoic and in another the appearance was suggestive of an endothelial cell densely packed with rickettsiae.

Five reproductions of photomicrographs illustrate the article, and they certainly appear to justify the author's view that rickettsiae can occasionally be seen in blood films from patients suffering from severe attacks of typhus fever.

John W. D. Megaw.

D'IGNAZIO, C. Le complicanze del dermatifo. [The Complications of Typhus.] *Bol. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1946, v. 6, Nos. 1/2, 97-105. [Summary in English by the author.]

"The more common complications of typhus in Ethiopia are described by the author as well as the rarest."

D'IGNAZIO, C. & CODELEONCINI, E. La prognosi nel dermatifo. [The Prognosis of Typhus.] *Bol. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1946, v. 6, Nos. 1/2, 53-68.

STUART, G. The Typhus-Relapsing Fever Association. *Epidemiological Information Bull.* (UNRRA Health Division). Washington, D.C. 1946, v. 2, No. 16, 665-74.

The author discusses the degree to which epidemics of the louse-borne types of typhus and relapsing fever are associated with each other in time and place.

(1) Epidemics of louse-borne typhus may occur in the absence of epidemics of louse-borne relapsing fever, as in Germany between 1941 and 1946, in Algeria in 1920-1923, in Tunisia in 1937, in Morocco in 1928, and in Poland in 1945-1946.

(2) Epidemics of relapsing fever may also occur in the absence of epidemics of typhus; for example the epidemic of relapsing fever, which started in French West Africa in 1921, swept through the French Sudan and Anglo-Egyptian Sudan, and was finally arrested in 1927. Another example was the epidemic of relapsing fever in Kenya in 1945 and 1946.

[Between 1917 and 1924 relapsing fever in severe epidemic form swept over large areas of India in which epidemics of typhus had never been known to occur. The available evidence suggests that relapsing fever can establish itself in some hot countries in which typhus fever is not easily transmitted.]

(3) When epidemics of typhus and relapsing fever have been related to each other in the same areas there has usually been a time-lag between the commencement of the typhus epidemic and that of the epidemic of relapsing fever. During the years 1941 to 1946, epidemics of typhus and relapsing fever have occurred in Egypt, Tunisia, Algeria, French Morocco, and Rumania; in each case typhus appeared in epidemic form three or four years before relapsing fever, and in all these countries except Rumania there was a similar time lag between the peaks of the epidemics.

In the great epidemics in Russia during 1919 and 1920 typhus became intensely prevalent a year earlier than was the case with relapsing fever though the peak year of prevalence of the two diseases was 1920

In associated epidemics of these diseases relapsing fever tends to subside more rapidly than typhus

John W D Megaw

WISHART F O & MALCOMSON M Elizabeth *Studies of the Serology of Typhus Fever Canadian J Pub Health* 1946 Sept v 37 No 9 369-81 1 fig [17 refs]

The authors have studied the properties of the complement fixing antigens of epidemic and murine typhus rickettsiae and of *Proteus OX19* with special reference to the heat stable antigens whose presence in *Rickettsia prowazeki* and many other organisms had already been demonstrated

In the present study antigens were prepared in various ways from two strains of *R. prowazeki* from the Castaneda strain of *R. mooseri* and from

were used

stable antigen contained two factors one of which was common to *Pr OX19* while the other was present only in the rickettsial strains *Pr OX19* in turn possessed a second factor concerned with reactions in proteus antiserum but

John W D Megaw

HAMMARSTRÖM E FAHRÆUS J & HELLSTEN M D H *Research on the Weil Felix Reaction and the Specific Agglutination of Rickettsias in Patients suffering from Exanthematic Typhus Bill Office Internal d Hyg Publique* 1946 Apr May June v 38 Nos 4 5 & 6 270-73

The authors carried out Weil Felix and rickettsia agglutination tests on the sera of about 200 typhus patients who were refugees from German concentration camps

The rickettsia agglutination test was carried out by the technique of Packalen who according to the authors seems to have been the first to attempt the specific agglutination of Rickettsias and the fixation of the alexin on a sufficiently large scale The rickettsial suspensions were prepared from yolk sac cultures by differential centrifugation the readings were made after the test dilutions had been kept for four hours in the incubator at 37°C and through the night at laboratory temperature A droplet of the lowest layer of each dilution was placed on a slide dried in air stained with cyanosine and examined microscopically The presence of even the smallest clumps was regarded as showing a positive reaction

The suspensions of *Proteus OX19* were treated with alcohol and ether by Gard's method they were dried ground in a mortar and stored in tubes with rubber stoppers In this form the test material kept well for at least six years Readings were made after 24 hours in the incubator

Using these methods the authors found that about half of the patients reacted with the rickettsia-agglutination test at a titre of 1-81,920, and with the Weil-Felix test at a titre of 1-320 by the 8th or 9th day. These titres were taken as indicating positive reactions; in 22 cases the rickettsia test was positive and the Weil-Felix negative; in six cases the Weil-Felix was positive and the rickettsia negative.

The detailed results are shown in tables; there was a general degree of correspondence between the results in the two tests, but the rickettsia test was regarded as being more sensitive and reliable.

John W. D. Megaw.

MEYER, R. Gibt es eine für die Fleckfieberdiagnose bedeutungsvolle Reifung der agglutinatorischen Kraft im Sinne Schroers? [Has the Ripening of the Agglutination Reaction the Significance in the Diagnosis of Typhus Fever claimed for it by Schröder?] *Zent.f. Bakt. I. Abt. Orig.* 1944, July 12, v. 151, No. 6, 302-7.

The author refutes the claim made by SCHRÖDER [see this *Bulletin*, 1945, v. 42, 545] that when the titre of the Weil-Felix reaction is observed after two hours' incubation and again after 22 hours at room temperature the rise in titre between the two observations is much greater in cases of typhus fever than in false-positive reactions due to other conditions.

Evidence is produced to show that the rise in titre is purely a "time function" independent of any differences in the quality of the agglutinins concerned.

The author gives a list of conditions that must be fulfilled before a titre of 1-400 after 15-18 hours' incubation can be accepted as significant; these include the absence of (1) icterus or hepatitis, (2) recent typhus vaccination, and (3) *Proteus X19* infection.

The paper will be found interesting by students of the Weil-Felix reaction.

John W. D. Megaw.

OLITZKI, L., CZACZKES, J. W. & KUZENOK, A. Endotoxic Factors of *Rickettsia prowazeki* and their Immunological Relationship to the Endotoxins of other Gram Negative Microorganisms. *J. Immunology.* 1946, Aug., v. 53, No. 4, 365-70.

Olitzki *et al.* have already shown that rickettsial vaccines heated for two hours at 100°C. contain toxins which, when injected into white rats, produce effects similar to those produced by other Gram-negative organisms; the effects include a fall of temperature and a lowering of the glycogen content of the liver.

In the present experiments it was found that rats, after immunization by heat-killed vaccines made from *Rickettsia prowazeki*, or *Proteus X19*, or *Shigella dysenteriae*, no longer showed toxic effects after injections of epidemic-typhus vaccine. No specific difference was detected between the immunizing power of the three vaccines.

So also it was found that rats immunized by the endotoxins of *R. prowazeki* were as resistant to the endotoxins of *Pr. X19* and *S. dysenteriae* as they were to the endotoxins of *R. prowazeki*.

The authors conclude that the endotoxic factors of *R. prowazeki* are possessed in common by certain Gram-negative organisms, and confer a "factor-specific" immunity against the endotoxins of these organisms, which, therefore, are immunologically related to *R. prowazeki*.

The bearing of these findings on the classification of the rickettsiae is discussed; these organisms obviously contain a toxic product which is a common constituent of a large group of Gram-negative bacterial organisms.

John W. D. Megaw.

The vaccines consisted of preparations of yolk-sac cultures of murine and epidemic rickettsiae attenuated by drying *in vacuo* and storage.

Dried murine vaccine after four-weeks' storage was injected intramuscularly into eight persons of whom three had a febrile reaction and an OX19 titre which ranged from 1-500 to 1-2,000; the others had no febrile reaction but their Weil-Felix titres ranged from 1-50 to 1-1,000. The vaccine after storage for 5-6 months seems to have caused no reaction in any of the eight other subjects who were inoculated, but in two of them the Weil-Felix titre was 1-2,000 four weeks later, in one it was 1-200, and in the remaining five it was zero.

A group of 40 persons received the vaccine after it had been stored for eight months; there were no reactions. A week later these persons received an epidemic-typhus vaccine prepared in the same way, but stored for 14 to 60 days. Within three days half of them were already febrile and by the end of seven days 39 were febrile. Altogether, at some period, 23 had temperatures of 39°C. or over, and 8 had temperatures in excess of 40°C. By the end of 17 days the temperature of 30 of the persons had fallen to normal.

The paper shows fever curves conforming to types of fever.

Second vaccination a suspension of a virulent culture of *Rickettsia prowazeki* was rubbed into the scarified skin of each 40 persons; no reaction was observed in any case.

The authors admit that the vaccine is not suitable for general use, but they claim—not without reason—that it is "anti-infectious", and not merely antitoxic.

John W. D. Megaw.

GRUPE, V., NIGG, Clara & MACFARLANE, J. O. On Increasing the Yield and Potency of Typhus Vaccine prepared from Infected Yolk Sacs. *J. Immunology*. 1946, Aug., v. 54, No. 4, 303-14. [14 refs.]

This paper was received for publication on June 23, 1944, but was withheld for some time "for reasons of national security."

The authors describe methods of increasing the yield and potency of epidemic-typhus vaccines, prepared by Craigie's method from yolk sacs infected by Cox's method.

The potency of the vaccine was tested (1) by the mouse-protection test; in which the power of sera of guinea-pigs immunized by the vaccine to neutralize lethal doses of the rickettsial toxins was used as the standard; mice being used as the test animals; (2) by complement-fixation tests; and (3) by estimating the number of rickettsiae in strained smears of the vaccine.

The total yield for each inoculated egg was increased: (1) by incubating the eggs in the vertical position with the air-sac end uppermost; (2) by delaying the death of the embryo through the use of suitable doses of the inoculum; (3) by harvesting only the embryos still alive on the day on which the peak of embryo deaths occurred; and (4) by inoculating the eggs on the 7th instead of the 6th day of incubation.

The potency of the vaccine was highest when the yolk sacs harvested were from embryos dying on the day of peak of deaths of the embryos, or on the previous day, and from those still living on the day of peak of deaths.

Taking into account the three factors—yield, potency, and cost of candling, the best results were obtained when the peak of embryo deaths fell on the 7th day after inoculation, all embryos dying before the 6th day being discarded. When the peak of deaths fell on the 6th or 8th day the yolk sacs still living on those days could profitably be harvested, but dead embryos should be discarded.

John W. D. Megaw.

COX G W Lavaca County Typhus Research Unit Narrative and Progress Report for the Period October 1st, 1944, to December 1st, 1945 *Bull Office Internat d Hyg Publique* 1946 Apr-May-June v 38 Nos 4 5 & 6 235-50

This is an interim report of an investigation into murine typhus in a heavily infected county in Texas. No less than ten teams of experts are engaged in the study of the various aspects of the disease.

In view of the expected appearance at a later date of a complete report this abstract will deal only with a few points of interest.

Evidence has been obtained which suggests that control measures especially the use of vaccine may have caused a reduction in the incidence of the disease in the county. In 1944 there were 157 cases and in 1945 only 51. Dusting of the rat runs with DDT caused at least a temporary reduction in the rat flea incidence and this may be important because there was a direct association between this incidence and the prevalence of the disease.

In urban areas the great majority of the rats gave positive complement fixation reactions. In rural areas nearly 50 per cent of the rats reacted. Three species of fleas were found infected—*Xenopsylla cheopis*, *Leptopsylla segnis* and *Echinophaga gallinacea*. A few pools of lice found on rats were infected. All the mite pools were free from infection.

Encouraging results were obtained from the use of sodium fluoroacetate as a poison for rats and mice.

The brown rat *Rattus norvegicus* was found only in an urban area. The roof rat *Rattus rattus* was found throughout the county.

The arthropods found on rats were—6 species of fleas, 4 of mites and 2 of lice.

Among 92 cats 19 per cent were positive. From cats and dogs only 3 said to require checking.

The significance of the complement-fixation test is said to be doubtful. Serological tests suggest the possibility that cotton rats, wood rats, bats and squirrels may harbour infection but few fleas were found on any of the wild animals examined in the area.

John W D Megaw

POMALES LEBRON A, ARBOYA G, MORALES OTIERO P & KOPPISCH E. The Complement-Fixation and Weil-Felix Reactions in a Study of Typhus among Wild Rats. *Puerto Rico J Pub Health & Trop Med* 1946 June v 21 No 4 350-56 [Spanish version 357-63]

Serological tests were carried out between December 7, 1944 and June 22, 1945 on 443 rats caught in San Juan and Santurce, Porto Rico. More than 500 cases of murine typhus had been reported from these localities during the previous five years. In the complement fixation tests an epidemic type of antigen was used because no murine antigen was available.

Of the 443 sera 30 were anticomplementary. Among the remaining rats 54 per cent gave positive reactions. Among the 24 small (young) rats 42 per cent

tl
a.

reactions whereas 139 gave positive complement fixation reactions.

Among 112 rats that gave negative complement-fixation reactions, 17 per cent. were positive with the Weil-Felix test.

The author suggests that young rats should be chosen, as far as possible, for the tests, and he points out that positive complement-fixation reactions do not necessarily mean that a transmissible infection is present in the animals.

John W. D. Megaw.

DIAZ-RIVERA, R. S., SANTOS, J. J. & PEREZ-SANTIAGO, E. The Treatment of Murine Typhus with Para-Aminobenzoic Acid. A Preliminary Report. *Bol. Asoc. Med. de Puerto Rico*. 1946, June, v. 38, No. 6, 189-94, 3 charts.

The authors report decided benefit from the administration of para-aminobenzoic acid to three patients suffering from murine typhus. There were no controls. Daily doses of 16-24 gm. were given: the treatment was started on the 5th, 7th and 8th day respectively, and in each case clinical improvement was observed within 24 to 48 hours. In two cases, the temperature fell by crisis; all three patients were free from fever or symptoms within three or four days, "and the course of the disease was practically shortened." No toxic symptoms were observed. The total dosage ranged from 86 to 136 gm.

John W. D. Megaw.

KIKUTH, W., with SCHILLING, Ilse. Chemotherapeutische Versuche beim Fleckfieber (*R. mooseri*) mit Methylenblau. [Investigation of the Chemotherapeutic Action of Methylene Blue in Murine Typhus.] *Zent. f. Bakt.* I. Abt. Orig. 1944, July 12, v. 151, No. 6, 293-302, 5 figs. [11 refs.]

In a large series of controlled experiments it was found that methylene blue, administered in suitable doses by subcutaneous injection or by the mouth, had a pronounced beneficial effect on mice inoculated with lethal doses of *Rickettsia mooseri* intraperitoneally or by the nasal route.

Combined treatment with immune serum and methylene blue did not give better results than were obtained by the dye alone.

The criterion adopted in the tests was the survival of the animals for longer than ten days, but some of the animals surviving for that period died later, "presumably, according to the author, because of generalization of the infection or of anaemia caused by methylene blue.

The possibility of using the drug in human patients is discussed in guarded terms; early and continued treatment with therapeutic doses by the mouth is considered worthy of a trial.

John W. D. Megaw.

WILEY, J. S. Recent Developments in Murine Typhus Fever Control. *Amer. J. Pub. Health*. 1946, Sept., v. 36, No. 9, 974-83, 4 figs.

In 1944 the reported cases of murine, "or rat-borne", typhus in the U.S.A. numbered 5,300, and in 1945 the figure was 5,167. The author believes that

small areas in the business sections of towns and cities, but that south of this latitude many cases occur also in residential and rural areas.

Some of the new methods of control described by the author are as follows: Flea control by a powder containing 10 per cent. of DDT is said to give quick though temporary results. The powder is applied in localized patches by a hand shaker to rat runs and other places frequented by rats; the amount needed for each establishment varies from one to five pounds. This method is now used as a routine a few days before the employment of any method of rat

control Calcium cyanide is preferred for dusting rat burrows because it kills the rats as well as the fleas

A new method of poisoning rats is said to be more than ten times as efficient as any of those formerly used. The poison is 1080 (sodium fluoroacetate), 12-14 gm dissolved in one gallon of water is distributed in paper cups of the $\frac{1}{4}$ oz size. It is stated that during a period of two months an average of six ^{Red squill} _{ments} The

Mention is made of ANTU (alpha naphthyl thiourea) which is used as a 20 per cent dusting powder in the same way as DDT but with the object of killing the rats which ingest the poison when they lick the part of the body that has come into contact with the powder. This method is effective against Norwegian rats but not against most other species and tolerance is quickly established.

The original paper can be read with profit by all who are concerned with the control of rats and their fleas
John W. D. Megaw

JOHNSON D. H. The Rat Population of a newly established Military Base in the Solomon Islands. *U.S. Nat. Med. Bull.* 1946 Oct. v. 46 No. 10 1628-32

This military base was a beach head at Cape Torokina on Bougainville Island with a sparse Melanesian population living in small villages along the shore. Three species of rats inhabited or came to inhabit the area of which one was the domestic rat *Rattus rattus* which was introduced from the ships of invasion. The other two native rats were *Rattus exulans* closely related to the *R. concolor* group and *Rattus praetor* which is related to the *R. leucopus* or *R.*

Rattus praetor
is restricted
sylvatic rodents
played a part in the epidemiology of tsutsugamushi diseases or scrub typhus
at the Juba River outpost. They were infested with the chiggers of
trombiculid mites
W. F. Harey

RIPLEY H. S. Neuropsychiatric Observations on Tsutsugamushi Fever (Scrub Typhus). *Arch. Neurology & Psychiatry* 1946 July. v. 56 No. 1 42-54
[10 refs.]

Neuropsychiatric observations were made on a group of 51 patients with tsutsugamushi fever during an outbreak on Goodenough Island. Mortality was 25 per cent. All patients exhibited involvement of the central nervous system, manifestations ranging widely from transient toxic cerebral symptoms to evidence of severe widespread inflammation resulting in coma and death. Pathologic changes in the central nervous system were similar to those found in other organs of the body and consisted of focal lesions characterized by necrosis, thrombosis and perivascular infiltration with numerous mononuclear cells, lymphocytes and plasma cells and rare polymorphonuclear leukocytes. The rate and degree of recovery varied considerably. Twenty nine per cent of patients on whom follow up data were available eighteen months after the acute phase of the disease showed residual manifestations most of which

appeared to be secondary to organic changes of the central nervous system. None had symptoms of sufficient severity to prevent performance of useful work. During the acute illness symptomatic treatment and good nursing care were of major importance. During convalescence graduated activity under medical supervision and prompt treatment of psychoneurotic manifestations facilitated recovery. Psychotherapy, with a brief analysis of personality reactions, explanation, reassurance and encouragement, was found to be of benefit."

DE PAULA, A. Tifo exantemático em Juiz de Fora. Dois sintomas novos constantes nos casos observados. [Exantemático Typhus in Juiz de Fora (Minas Gerais). Two New Signs constantly observed in our Cases.] *Rev. Brasileira Med.* Rio de Janeiro. 1945, Nov., v. 2, No. 11, 907-11. English summary.

All the five patients in whom the new signs were seen lived in the same house; four were attacked within a period of 12 days in June 1945; the fifth fell ill in August 1945. The last patient had been bitten by ticks three days before the onset, there was no history of bites by arthropods in any of the other cases. None of the patients died, and only one had a severe attack.

The Weil-Felix responses were of the OX19 type, but most of the tests were carried out some weeks after recovery. The OX19 titre in the last case, in which the test was made during the illness, rose to 1-1,210 and there was a positive reaction 1-640 with the OXL strain isolated by de Magalhães.

The signs are described as (1) straw-coloured vesicles situated on the palate and anterior pillars of the fauces, and (2) white porcelain-like ulcers with irregular margins on each side of the anterior pillars of the fauces.

A tick-infested dog was suspected of being the source of infection, but the authors state that in Brazilian typhus the possibility of transmission by bugs, lice and fleas, as well as by ticks, must be considered. John W. D. Megaw.

Protz, H. The Interpretation of the Weil-Felix Agglutination Test in Rocky Mountain Spotted Fever. *J. Lab. & Clin. Med.* 1946, Sept., v. 31, No. 9, 982-6. [18 refs.]

In 19 cases of Rocky Mountain spotted fever in which the diagnosis was confirmed by the complement-fixation test or by isolation of the infecting agent, the author carried out Weil-Felix tests on two to four occasions with controlled non-motile strains of *Proteus* OX19, Pr. OX2 and Pr. OXK. The technique employed was that described in *Diagnostic Procedures and Technique* (American Public Health Association, 1945).

The following analysis shows the four types of reaction observed:—

Analysis of Reactions

Cases	OX19 Titre		OX2 Titre	
		Range		Range
11	Higher than OX2	160-2,560	Lower than OX19	0-640
4	Lower than OX2	0-160	Higher than OX19	640-2,560
3	Low or negative	0-40	Negative	
1	Same as OX2	320	Same as OX19	320

The author states that these results are comparable with those obtained by SPENCER and MAXCY (*Pub. Health Rep.*, 1930, v. 45, 440) and DAVIS and PARKER (*ibid.*, 1932, v. 47, 1511); they show that the commonest type

whereas the OX19 average titre in louse-borne and flea-borne typhus is shown as +++ [For a later table prepared by Felix see this *Bulletin*, 1943, v. 40, 231, in which the tick borne typhus fevers are shown as belonging to the "undetermined immunological sub-group" and the louse-borne and flea borne typhus fevers of South Africa are included in the same sub-group]

The author suggests that the usual types of reaction are as shown in the following table —

	OX19	OX2	OXK
Epidemic and murine typhus	++++	+	0
Scrub typhus	0	0	++++
Rocky Mountain spotted fever (a)	++++	+	0
(b)	+	++++	0

It appears that the reaction of the Rocky Mountain spotted fever is of the —320 or over the disease can be the Weil Felix proteus agglutination is considered a non specific test the final laboratory diagnosis will depend upon the isolation of the infectious agent or the demonstration of specific antibodies "

[A study of the detailed table showing the reactions suggests that the types of response obtained in Rocky Mountain spotted fever would be more accurately indicated as follows —

OX19 titre	OX2 titre	OXK titre
0 to ++++	0 to ++++	0

Another point that emerges from the table is that the complement-fixation reaction in five cases became positive later than the Weil Felix, for example, an OX2 titre of 1-1,280 is shown in one case on the 21st day when the fixation was an OX19 es the fixation On the other hand, in three cases the fixation test was positive earlier than the Weil-Felix ; in one case it became positive on the 4th day, and in another on the 7th day,

Twelve cases were seen between March 1944 and February 1945 in the Atherton plateau which is at an altitude of 2,000 to 2,500 feet. The climate of the plateau is relatively temperate, and the rainfall is about 60 inches. Scrub typhus had occurred in certain parts of the area among thousands of troops engaged in military exercises in the area, many of which many occur in the plateau.

Only one species of tick, *Ixodes holocyclus*, was found on human hosts in the area, but three other man-biting ticks were known to occur: *Haemaphysalis bancrofti*, *Boophilus annulatus microplus*, and *Rhipicephalus sanguineus*. Seven of the patients were known to have been bitten by ticks; in one case the tick, *I. holocyclus*, was still attached to the patient at the time of admission to hospital. In the cases in which there was no history of tick bite the patients had been exposed to special risk of bites.

An eschar with associated lymphadenitis occurred in one patient. In one of these an adult tick had been found at the site of the eschar.

Ten of the 12 cases occurred in the rain forest parts of the area among the many

Ten of the 12 cases occurred in August and September, the period of the early spring rains, when *I. holocyclus* was most abundant. The clinical features as described conform to those of the typhus group, the average duration being 10 to 12 days. A rash was present in 10 cases, and in 11 cases maculopapular lesions were present. In 10 cases the lesions were exposed to special risk of bites. An eschar with associated lymphadenitis occurred in nine cases, and in two of these an adult tick had been found at the site of the lesion.

The clinical features as described conform to those of a mild fever of the typhus group, the average duration was 7½ days, with an extreme range of 2 to 12 days. A rash was seen in 11 cases, it was very variable in appearance, macular, papular, or maculo-papular.

The maximum Weil-Felix titres were as follows.—In 9 cases the *OXY* titre was 1-320 or over; in 3 of these the *OX2* titre was 1-160 or over, but in each case it was lower than the *OXY* titre, in one case there was a rising-titre *OXY* reaction with a maximum of 1-160; in the remaining 2 cases the *OX2* titres were higher than the *OXY*, being 1-320 and 1-640, whereas the *OXY* titres were 1-80 and 1-160. The *OXA* titre never exceeded 1-80 and it was not of any significance. [There is a general correspondence between the titres of the *OXY* and *OX2* by Plotz in cases of *B. paratyphi* B. (Plotz, 1950).]

The *OXX* titre never exceeded 1-80 and it was not of the rising-titre type. [There is a general correspondence between these findings and those reported by Plotz in cases of Rocky Mountain spotted fever (see Plotz above).] Rickettsial strains were isolated from two patients who reacted with enlargement of spleen and lymph nodes. The rickettsia-like

Rickettsial strains were isolated from two patients by intraperitoneal inoculation of 1.0 cc. of fresh blood into vitamin-deficient white mice, which reacted with enlargement of the spleen and a peritoneal exudate containing rickettsia-like bodies. Guinea pigs inoculated with spleen suspensions of the mice reacted with fever and scrotal reaction, but recovered. Several successive passages were made through guinea pigs.

Several other cases were seen which might have been the same as the first patient. Samples of serum from these patients were tested by the complement-fixation test and it was not of the rising-titre type characteristic of Rocky Mountain spotted fever (see PLOTZ above.)

The diagnosis remained doubtful.

Several other cases were seen which might have been of the same kind, but the diagnosis remained doubtful.

Samples of serum from five of the patients, and from patients infected in the same area, were tested when none of the tick-typhus (1-80) against epidemic typhus (1-5,120 and 10,240) with epidemic rickettsia. Complement-fixation tests were also made and at titers of 1:100 and 1:200 reacted with the following:

the following types:—epidemic typhus, murine typhus, boutonneuse fever, South African tick-bite fever, and Rocky Mountain spotted fever. The two murine-typhus sera reacted with murine antigens at titres of 1-60 and 1-80, otherwise all the reactions were completely negative so that the tests did not indicate any immunological relationship between the North-Queensland tick typhus and any of the above fevers of the typhus group.

John W. D. Megaw.

PLOTZ H., SMADEL, J. E., BENNETT, B. L., REAGAN, R. L. & SNYDER M. J.
 North Queensland Tick Typhus: Studies of the Aetiological Agent and its
 relation to other Rickettsial Diseases. *Med J Australia* 1946 Aug 24,
 v. 2, No. 8 263-8 [23 refs]

The serological tests carried out by the senior author in connexion with North Queensland tick typhus have already been mentioned in the abstract above (ANDREW *et al*). The present paper deals with a further laboratory investigation of a tick typhus strain of rickettsiae received from Australia in the form of lyophilized yolk sac material.

Passage of the strain through guineapigs was maintained by intraperitoneal

Sera of guineapigs convalescent from experimentally induced attacks gave complement fixation titres ranging from 1-40 to 1-320 when the homologous antigen was used. Negative reactions were observed in these animals when the following antigens were used—epidemic typhus murine typhus, Rocky Mountain spotted fever, South African tick bite fever, boutonneuse fever and Q fever.

On the other hand, guineapigs convalescent from North Queensland tick

The conclusion reached was that the rickettsia of North Queensland tick typhus differs from the others mentioned above and may well be a hitherto undescribed species.

John W. D. Megaw

FLANNERY, J. F. & SNYDER, M. J. North Queensland Tick Typhus: A Comparative Study of the Aetiological Agent and its Relation to other Rickettsial Diseases. *Med J Australia*

The two strains of rickettsiae were compared in laboratory and one of the strains was also compared with the earlier strain in the later passages. The murine strains yielded more numerous rickettsiae and the embryo deaths were rather later on the average. Both strains when inoculated intraperitoneally into guineapigs caused very similar febrile and scrotal reactions.

Guineapigs convalescent from attacks caused by each strain showed a considerable but incomplete, degree of immunity against inoculation by the other strain.

The murine strains could be recovered from the brain of white rats up to 258 days after infection from the spleen.

I found in the nuclei as well as in

Complement-fixation tests were carried out on sera from patients suffering from tick typhus and murine typhus; the antigens were prepared from yolk-sac cultures; low-titre reactions were obtained with the homologous antigens and negative reactions with the heterologous.

The reactions of tick-typhus patients were at titres ranging from partial 1-4 to complete 1-32.

Full details are given of the technical methods employed in the study.

John W. D. Megaw.

DENGUE AND ALLIED FEVERS.

SOUBICOU, X. Une épidémie de dengue à la Martinique. [A Dengue Epidemic in Martinique.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 270-72.

HUGHES, A. C. C. The Leucocyte Count in Dengue. *J. Roy. Nav. Med. Serv.* 1946, July, v. 32, No. 3, 194-6.

The author refers to a statement in the *Roy. Nav. Med. Bull.*, No. 13, 20, to the effect that in dengue a shift to the left in the neutrophiles does not occur. The statement precedes an abstract from a paper by SABIN *et al.* [this *Bulletin*, 1944, v. 41, 1031] which describes the invariable shift to the left encountered in sandfly fever. Reference is also made to the work of SIMMONS *et al.* [this *Bulletin*, 1931, v. 28, 613] which reported an invariable left shift in dengue after the first day of illness. This feature, together with leucopenia, Simmons regarded as "the most reliable single diagnostic sign of dengue".

The present author rightly points out that if there is in fact such a difference in the behaviour of the neutrophiles in dengue and sandfly fever, it would be of important diagnostic value and would indeed throw doubt on the accepted close aetiological resemblance between the two diseases: and with these conflicting statements in mind, he carried out serial blood counts on the staff of a hospital ship in the Indian Ocean, who had probably acquired dengue in Calcutta. Adequate epidemiological and clinical evidence is given in support of his diagnosis.

Schilling and Cooke-Arneth counts were carried out sixty times on different days of the illness. From the 3rd to the 6th day there was a fall in the total count, which commonly became normal before the 11th. At some stage, the total leucocytes usually fell to below 5,000 per cmm. and counts of less than 3,000 were not uncommon. The lymphocyte count was low by the 2nd or 3rd day, though it never fell below 1,000.

There were but the neutrophiles: less at some stage. or 3rd day. Stab cells invariably increased on the 2nd day, and remained high in proportion to the segmented cells for the first five days: the juvenile cells were increased initially, but to a less extent and constancy.

A left shift in the Cooke-Arneth count occurred and was at its maximum between the 2nd and 5th days.

The return of the neutrophiles to normal was slow, and often was incomplete on the tenth day: during convalescence, Turck cells were frequent.

Detailed counts of six patients are shown in a table. The author's results correspond with those of Simmons in experimental dengue and do not differ essentially from those of Sabin in sandfly fever. He therefore concludes that the leucocyte count is not likely to assist in the differential diagnosis of these two diseases.

H J O D Burke-Gaffney

LIVESAY H R WILSON D J POLLARD M & WOODLAND J C Experimental Studies of Bullis Fever and Dengue Fever *Amer J Trop Med* 1946 Jul v 26 No 4 379-81 1 chart

given in all the cases the subcutaneous route was employed

temperature never exceeded 99.5°F]

The volunteers were inoculated 27 days after defervescence with 0.4 cc of dengue-infected human serum. All three and also a normal-control volunteer similarly inoculated developed a typical syndrome of dengue fever on the 6th or 7th day; the fever lasted six to seven days and was accompanied by malaise, headache, leucopenia and a generalized rash. The maximum temperatures ranged from 102.4 to 104.5°F.

The authors state that on the basis of this challenge experiment no relationship between Bullis fever and dengue could be demonstrated though they add that it is possible that strain variations may alter the results to some extent.

In their reference to the aetiology of Bullis fever the authors remark that the Bullis fever agent has been described as rickettsia like in morphology. This statement seems to suggest that they maintain an open mind regarding the nature of the causal agent.

John W D Megaw

WEBER F C OPPEL T W & RAYMOND R W A Mild Exanthematous Disease seen in the Schouten Islands *Amer J Trop Med* 1946 Jul v 26 No 4 489-93 11 refs]

During 1944 and 1945 the authors studied 48 cases of a mild fever lasting one to seven days and accompanied by an exanthem which persisted for seven to ten days; the patients had pain and swelling of the joints, enlargement of the lymph nodes and leucopenia. Medical men at three hospitals in the Schouten Islands north of New Guinea independently regarded the condition as distinct and unusual and gave it various names.

Of the cases seen by the authors 31 were treated at one hospital in the months of December 1944 and April-May-June and July 1945. At another hospital 17 cases were seen in March and April 1945; eight of these patients were members of the hospital staff who were admitted between March 20 and April 1.

The percentage incidence of some of the chief features was as follows:—maculo-papular rash 100; enlargement of lymph nodes 80; temperature 100°F or over 75; headache 50; swelling of ears 46; swelling of skin over elbows and knees 46; swelling of hands and feet 25; joint involvement 31; effusion into a joint 10. The total leucocyte count was less than 4,000 in 39 per cent of the cases. The rash appeared within the first three days in 85 per cent; at first it was a macular erythema occurring on the front and sides of the chest; it spread over the trunk and limbs, sometimes extending

to the face; the palms and soles were affected in 25 per cent. of the cases. The macules were about 10 mm. in diameter and commonly a papule appeared in the centre of each.

The duration of the fever was:—one or two days in 15 cases; three days in 17, four to six days in 14; and seven days in 1. Convalescence was always rapid.

Cultures of the blood, urine, and stools gave no information bearing on the aetiology. Agglutination tests for scrub typhus, the enteric group, and brucellosis were negative.

The disease differed from dengue in the more gradual onset, the mildness of the attacks, the absence of saddle-back fever curves, the slight degree of pain,

cases were being seen."

Although the disease resembled the "polyarthritis" described in Australia by HALLIDAY and HORAN [this *Bulletin*, 1944, v. 41, 279] it was regarded as differing, in being associated with leucopenia, in the less severe involvement of the joints, and the more pronounced rash.

In a foot-note it is stated that an epidemic is reported to have occurred in Bougainville, of a fever "almost exactly the same" as the one described by Halliday and Horan.

The authors make no claim that "the clinical evidence is sufficient to establish this disease as a new entity," and they state that the comments by the reviewer on the paper by Halliday and Horan apply equally to the present outbreak.

John W. D. Megaw.

PLAGUE.

ROUX, A. H. & MERCIER, C. Sur cinq cas de peste pulmonaire primitive dont trois suivis de guérison, observés à l'hôpital civil d'Oran. [Five Cases of Primary Pneumonic Plague with Three Cures.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 5/6, 173-8.

The first case in this series was that of a man admitted to hospital after the rapid death of four members of a family. He had continuous ineffective cough, high temperature, and blood-stained sputum; there were no buboes. Plague bacilli had been found in the sputum and were found also *post mortem* in the lung lesion. From this one patient, infection was transmitted to three persons in hospital and in each of these the affection had all the signs of plague bronchopneumonia, without development of buboes. Two patients were women and the third was the hospital chaplain. The fifth was a woman, who was also admitted to hospital and whose husband had been one of the original four patients who had died rapidly from presumed plague. Both of the men died and the three women were cured with dosages totalling 65 to 73 gm. sulphathiazole in 15 to 18 days. Recovery of three cases out of five from primary pneumonic plague is remarkable and the result is attributed entirely to the use of the sulphonamide drug.

W. F. Harvey.

RIEMAN, E. H. Antu. A Progress Report detailing Results obtained with this New and Highly Effective Rodenticide. *Soap*. New York. 1946, Oct., v. 22, No. 10, 135-7, 153, 1 fig.

A progress report of results obtained.

CHOLERA

STOWMAN, H. Cholera Situation, Summer 1946. Epidemiological Information
Bull. (UNRRA Health Division) Washington DC 1946, 2 No 16

Recent epidemiological data on cholera in the Far East. Recent information from provinces are of epidemic importance. At present Shanghai and present Shanghai are the chief centres of cholera in China. Tonking in Indo-China provides no information but there have been outbreaks in Cochinchina and in Cambodia. The cholera outbreak in Siam is in its third year. Malaya and Burma do not seem to have been unduly affected but parts of India have had a specially bad cholera year. Cholera in Ceylon has been insignificant and there has been no case of cholera west of India since 1931, apart from the Afghanistan-Iran outbreak of 1935-39. W. F. Harvey

SEAL, S. C. A Note on Cholera Outbreaks (1944-45) in the Singur Health Centre Area, Bengal, with special reference to Control Measures. Indian Med Ga. 1946 Aug, 81 No 8 321-6. 1 map & 1 chart

Note may well be taken of the idea to set apart a special area for investigation into the numberless problems which confront the epidemiologist with regard to outbreaks of a specific disease. The area in question rural 33 square miles with a population of 63,000 has had 27 outbreaks of cholera within a year studied by the All India Institute of Hygiene and Public Health. One important objective was to find a simpler but efficient method of control within the means of the local health organization and the community. In summarizing the article it seems best and most useful to confine oneself to an abbreviated version of the detailed instructions given before leaving the patient's house. —(1) Administer sulphaguanidine according to instructions (2) Give enough fluid to the patient (3) Call the doctor if the patient takes a bad turn (3) Keep the patient warm (4) Call the doctor if the patient takes a bad turn (5) Keep bleaching powder solution (1 teaspoonful gallon) in an earthen vessel for the hands of attendants and for disinfection at all times (6) Collect vomit and stool in earthen pans (7) Disinfect pans to be re-used with strong bleaching powder solution (8) Keep medicine utensils and other materials used by the patient strictly separate to be finally buried or disinfected (9) Bury the food left by the patient and burn burrs or disinfected bedding (10) Never wash anything in contact with a patient in a tank or other water source (11) Wash your own hands after all occasions of contact with the patient and keep away from the kitchen (12) Keep children and non-attendant adults away from the patient (13) Use only running water for household purposes and boil all drinking water for the duration of the outbreak (14) Cover all foods eat them all hot if practicable and drink only boiled milk. Disinfect the hands always before eating (15) Avoid sulphuric acid (16) Spt chlorof 1) if a contact Take a dose of sulphaguanidine and 3. Spt chlorof 1) if a contact. Treat all excreta in the

SEN, S. N. Studies on the Biochemistry of the "Cholera-Red" Reaction. Part I. *Indian J. Med. Res.* 1946, May, v. 34, No. 1, 151-5.

Biochemical study of the metabolic activities of bacteria has provided not only interesting facts regarding the life of those lowly unicellular organisms, but at the same time furnished tests for the differentiation of species. Bacteria produce de-amination or decarboxylation of the nutrient amino-acids. The "cholera-red" reaction is due to the presence of a nitroso derivative either of indole or of a compound containing indole ring derived from tryptophan and nitrate. Its absence is an important negative test in cultures containing no inhibitory glucose, although other vibrios also may give a positive reaction. Experiments are detailed in this article, which show that reducing agents such as "glucose, cysteine and ferrocyanide exert an inhibitory influence on the 'cholera-red' reaction" and that they act either by inhibiting the formation of the enzyme concerned or by diverting the course of enzymic reaction so that the particular end product to which positive reaction is due is not formed. As might be expected, on this view, oxidizing agents promote the reaction, acting as "catalysts".

W. F. Harvey.

SEN, S. N., BASU, P. N. & CHAKRABORTY, D. C. Studies on the Biochemistry of the "Cholera-red" Reaction. Part II. *Indian J. Med. Res.* 1946, May, v. 34, No. 1, 157-60.

In this continuation of studies in..... enzymatic reaction involved. specific activity, especially when vibrio, it is not to any extent separable from the cell. Washing of the vibrios of a culture which had failed to give the reaction resulted in its becoming strongly positive. "As the positive reaction was obtained within the resting phase of the cells it appears that the initial negative reaction with whole culture was due to non-formation of the end product, though the enzyme was present." The enzyme action for break-down of tryptophan was prevented by the reducing agent glucose, and its presence was demonstrated after washing away the glucose. A modification of the technique of the reaction is suggested by the authors: a suspension of a 5- to 6-hour ordinary culture of vibrios is added to a sterile solution of tryptophan and sodium nitrate. The addition of sulphuric acid, after 45 to 60 minutes, elicits the "cholera-red" reaction.

W. F. Harvey.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

FLETCHER, J. P., DOUGAN, A. A. & SAMMON, G. K. Amoebiasis. *Canadian Med. Ass. J.* 1946, Sept., v. 55, No. 3, 278-83.

ROBINSON, R. A. Amebiasis. *Southern Med. J.* 1946, Nov., v. 39, No. 11, 876-80. [23 refs.]

SINGH, G. Amoebic Abscess of Liver bursting into Pericardial Cavity. *Indian Med. Gaz.* 1946, Aug., v. 81, No. 8, 299-301, 1 chart & 4 figs. on 1 pl.

LAWRENCE, D. Diagnosis of Intestinal Amoebiasis. [Correspondence.] *Brit. Med. J.* 1946, Nov. 9, 708-9.

The author questions the rationale of "provocative emetine" in the diagnosis of amoebic dysentery, referred to by HILL [this *Bulletin*, 1947, v. 44, 87]

amoebae in the faeces or bowel scrapings in the course of acute and subacute amoebic infections, and the presence of cysts in the "quiescent" phase. In the former condition "the vegetative amoeba is almost always found" in the latter, prolonged daily stool examinations may be necessary over very long periods, and the practical difficulties of this are discussed.

hazardous one although acceptable in principle—suggested by the author, is to tell the patient to return *immediately* if diarrhoea recurs when the amoeba may be found if it is actively causative. He also mentions special stool culture

culties of examining a sufficient number of stool specimens to ensure the detection of cysts in the "quiescent" stage the reader is referred to the valuable statistical survey by MARSDEN and his collaborator in Australia [this *Bulletin*, 1947, v 44, 86] H J O D Burke Gaffney

THOMEN, L F & READ H. La reacción de Craig. Reacción de fijación de complemento para el diagnóstico de la amebiasis. [Craig's Complement Fixation Test in the Diagnosis of Amoebiasis] *Bol Asoc Med de Puerto Rico* 1946 Mar, v 38 No 3, 85-94 [37 refs]

specimens

C M Wenyon

MICHAEL, P. Intestinal Parasitism. A Statistical Study on 1,000 Patients recently returned from Pacific Area Duty. *U S Nav Med Bull* 1946, Oct, v 46, No 10, 1589-96 5 figs

Three thousand specimens of stool from 1 000 men recently returned from the Pacific Ocean area were examined for intestinal parasites. The protozoa were identified in iron haematoxylin stained smears, and a sucrose flotation technique was used for the determination of helminth infestations.

Two hundred and eighty nine individuals (28.9 per cent of the total) were found to harbour protozoal or helminthic intestinal parasites. *Endolimax nana* was the most common parasite (17.6 per cent being infected). *Entamoeba*

parasites on repetition of the stool examinations; 60 per cent. being discovered on examination of one specimen, and 90 per cent. on that of three specimens [eight specimens were examined at most, and this number (100 per cent. detection) was reached only in examinations for *Entamoeba histolytica* and for *Endolimax nana*].

Of the 89 patients infected with *E. histolytica* 74 were free from gastrointestinal symptoms; these 74 had been admitted to hospital for troubles unassociated with the presence of the parasite; 32.6 per cent. of the 89 harboured small-race *E. histolytica*, 60.7 per cent. large-race, and 6.74 per cent. a combination of both races. None of the type of parasite suffered from intestinal symptoms; infected with *E. histolytica* showed no changes attributable to their infestation.

All cases were therapeutically treated: the symptom-free patients with Diodoquin, either alone or in combination with Carbarsone, and the fourteen passing amoebae with emetine. Three negative stools constituted evidence of sterilization after treatment. There is little likelihood of dissemination on a substantial scale of intestinal parasites from those returning from overseas to the indigenous population; nevertheless, efforts should be made to detect and to eradicate such parasites from service personnel before their release.

A later survey of prisoners of war repatriated from the Far East, based on a single stool examination, showed the incidence of intestinal parasitization, especially with hookworms, to be surprisingly low. A. R. D. Adams.

PONTES, J. P. L. Incidência da amebíase e da giardíase no Rio de Janeiro. Estudo baseado no exame de 165 indivíduos. [Incidence of Amoebiasis and Giardiasis in Rio de Janeiro.] *Rev. Brasileira Med.* Rio de Janeiro. 1945, Oct., v. 2, No. 10, 823-35, 2 figs. [84 refs.] English summary.

The author has examined by floatation technique the stools of 165 inhabitants of Rio de Janeiro for evidence of *Entamoeba histolytica* and *Giardia intestinalis* infection. Of the persons examined 62 were patients in hospital while 103 were normal work people. Both parasites were encountered 19 times, giving an infection rate of 11.5 per cent. In no case was dysentery present, though 77 per cent. of those harbouring *E. histolytica* complained of symptoms which might be attributed to the presence of the amoeba. In only 36 per cent. of those infected with *G. intestinalis* was anything abnormal noted. C. M. Wenyon.

CHORINE, V. & TANGUY, Y. Influence du régime alimentaire sur le parasitisme intestinal. [Influence of Diet on Intestinal Parasitism.] *Bull. Soc. Path. Exot.* 1945, v. 38, Nos. 1/2, 42-6.

For a number of years, both before and during the war, patients submitting themselves for treatment at the Pasteur Institute in Paris have been examined for intestinal protozoal infections. The authors report that the percentage of positive findings recorded increased during the war to double and sometimes three times their pre-war level. This increase is attributed to the change in diet, which became largely vegetarian. It was perhaps to be expected, since it has been shown that in rats the naturally occurring protozoal infections are much reduced when the animals are kept on a diet rich in protein, while these animals are more readily infected with the human *Trichomonas* when on a diet rich in carbohydrate. C. M. Wenyon.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

INGRAHAM H S & LAPENTA R G Penicillin in the Treatment of Louse-borne Relapsing Fever *U S Nat Med Bull* 1946 Nov, v 46, No 11, 1719-23

'1 Fifty two patients with Egyptian louse-borne relapsing fever received 1 000 000 units of penicillin each in 25 000 unit doses intramuscularly every 3 hours. A cure of the relapsing fever was obtained in all 52 cases

'2 No relapses occurred in the treated group

'3 Relapse occurred in 87 percent of the 53 cases used as controls'

BOLTON A J The Infective Power of Emulsions of "Frozen or Freezing Organs" of Guineapigs Experimentally Infected with *Spirochaeta persica* Dschunkowsky 1912.] *Bull Soc Path Exot* 1946, v 39 Nos 5 6, 183-7

The author finds that the organs of guineapigs infected with *Spirochaeta persica* collected recent calls and processed in the following manner:

spirochaetes survive more readily at such temperatures and under these conditions, can even be dried *in vacuo*]

The author concludes that in the case of *S. persica* the handling of the cadavers of infected animals may be a source of accidental human infections and that the survival of the spirochaetes in animals after death may be a factor in the maintenance of the infection in nature

E Hindle

LEES A D Chloride Regulation and the Function of the Coxal Glands in Ticks *Parasitology* 1946 Aug, v 37 Nos 3 4 172-84 10 figs [20 refs]

is through this fluid that the infection of tick borne relapsing fever takes place so that the paper is evidently important in relation to the transmission of *Treponema duttoni* from tick to mammal. It remains for the parasitologist to reinvestigate the problems of transmission in the light of the detailed observations on anatomy and physiology set forth in this paper which is of unusual interest.] The paper can only be briefly reviewed here

paper contains similar studies on *Ixodes ricinus*, in which, owing to the absence of coxal glands, the mechanism for excreting chlorides and a very large bulk of water is entirely different.

P. A. Buxton.

POSPELOVA-STROM, M. V. & TIBURSKAYA, N. A. [On the Therapeutic Effect of Penicillin in Tick Spirochaetosis.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 1, 54-5. [In Russian.]

The authors record the results of penicillin treatment of tick-borne relapsing fever in man and in experimental animals. A laboratory assistant who was infected accidentally with an Iranian strain, was given 33,000 and 50,000 units of American penicillin on the second and third days respectively of the primary attack, with the result that the spirochaetes disappeared during the next three days and were absent for a month. In the course of this period, the patient was treated with osarsol (5 courses of 0.75 gm. daily for 3 days, followed by an interval of 4 days). On the 31st day the patient had a second attack, with a temperature rising to 41.2°C. and up to 18 spirochaetes per field in the blood. After administration of 50,000 units of penicillin on the 32nd day, the temperature dropped, the spirochaetes disappeared after 6 days and never returned again.

The effect of penicillin (of American and Soviet manufacture) was then tested on guineapigs experimentally infected with tick-spirochaetosis. The drug was injected intramuscularly on two successive days in doses of 2, 16 and 20 units per gramme of body-weight, while in the case of the Soviet preparations 1 and 4 cc. were given. Treatment with penicillin not only failed to suppress the attacks or to prevent relapses in guineapigs, but even prolonged the duration of the disease. On the other hand, while there were no deaths among the treated animals the mortality among the controls amounted to 50 per cent.

C. A. Hoare.

LEPROSY.

HANKS, J. H. A Note on the Numbers of Leprosy Bacilli which may occur in Leprous Nodules. *Internat. J. Leprosy* Cleveland, Ohio. 1945, Dec, v. 13, 25-6

CHATTERJI, A. K. R. A Short Note on Heredity in Leprosy. *Calcutta Med. J.* 1946, July, v. 43, No. 7, 237-8. [15 refs.]

MAFFRAND, R. Lepra ocular. [Ocular Leprosy.] *Dia Médico.* 1946, Aug. 5, v. 18, No. 32, 1058.

This brief paper speaks of leprosy affections of the eye in somewhat general terms, not going into detail nor giving any figures of prevalence of the ocular complications of leprosy. In the tuberculoid form the globe itself does not suffer. Cases which are recorded as leprosy iritis and irido-cyclitis, the author states, are not truly leprosy but tuberculous, syphilitic or due to sepsis. The lepromatous form does, however, affect the globe and that frequently, particularly the anterior parts, with infiltration of the cornea, especially the upper layers, and later the iris and the ciliary body. The conjunctiva, in spite of the fact that the secretion may contain many leprosy bacilli, is not usually itself involved. The sclerotic is affected in a manner similar to the cornea.

Little is said concerning treatment, merely that there is no specific treatment of much avail and that the "results are problematical." Surgical measures may be tried "according to the special circumstances of each case."

H. Harold Scott.

STEIN, A. A. & DOROFJEV, W. N. Zur Frage der Klinik und pathologischen Anatomie leproser Iritis. [Clinical and Pathological Anatomy of Leprotic Iritis.] *Internat J Leprosy* Cleveland Ohio 1945 Dec v 13 43-66, 5 figs on 1 pl

BIMBAD, S. M. Clinical Study of the Blood Glutathione in Leprosy. *Internat J Leprosy* Cleveland Ohio 1945 Dec v 13 31-42.

"1 A study of the glutathione content of the blood in leprosy is of aid in determining the state of the oxidation reduction processes in the patient

"2 In the tuberculoid and maculo-neural forms of the disease the total amount of glutathione in the blood does not differ from normal but the amount of the oxidized form decreases with a corresponding increase of the reduced form

"3 The qualitative and quantitative values of blood glutathione in patients with lepromatous leprosy of slight and moderate degrees of advancement of the

"6 Determination of the blood glutathione values in leprosy is of value in ascertaining the extent of compensation of the leprosy process

FIGUERO, N. & DESAI, S. D. Trial of Penicillin in a Case of Leprosy. *Leprosy in India* 1946 Apr v 18 No 2 53

"A lepromatous case was treated with penicillin 25 000 units every two hours for ten days. A total of 3 000 000 units was given. No good results were obtained. Similar results have been reported by Faget and Pogge. [See this Bulletin 1945 v 42, 646]

PANJA, G. Use of Penicillin in Rat and Human Leprosy. *Indian Med Gaz* 1946 Aug, v 81 No 8 306-7

The treatment was of no benefit.

TISSEUIL, J. L'acide ascorbique est inefficace en injections intradermiques des taches de lèpre tuberculoïde. [Ineffectiveness of Intradermal Ascorbic Acid in Tuberculoid Leprosy.] *Bull Soc Path Exot* 1946 v 39 Nos 7/8 258-9

FIGUERO, N. & DESAI, S. D. Treatment of Tuberculoid Leprosy with Methylene Blue and Glucose. *Leprosy in India* 1946 Apr, v 18 No 2, 51-2.

"(1) Fifty seven Nt_1 and 106 Nt_2 cases were treated with methylene blue 1 per cent solution pH 7 [10 cc intravenously twice each week] with an equal quantity of glucose 50 per cent solution

"(2) 77.2 per cent of Nt_1 and 82.6 per cent of Nt_2 cases showed improvement

"(3) The improvement was seen in most cases after treatment for four months

"(4) No case became worse"

TISSEUIL, J. Inactivité de l'huile iodoformée a 10 0/0 et action curative de l'huile de chaulmoogra iodée par voie intradermique dans les taches de lèpre tuberculoïde. [Inactivity of "Iodoform Oil" and Therapeutic Action of Intradermal Iodized Chaulmoogra in Tuberculoïd Leprosy.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 259-61.

HELMINTHIASIS.

EINHORN, N. H. & MILLER, J. F. Intestinal Helminthiasis: Clinical Survey of Six Hundred and Eighteen Cases of Infection with Common Intestinal Helminths in Children. *Amer. J. Trop. Med.* 1946, July, v. 26, No. 4, 497-515. [15 refs.]

The data on which this study is based have been published before in five separate papers [this *Bulletin*, 1945, v. 42, 578, 911, 912 & 914, and 1946, v. 43, 577]. There is thus much repetition which is excusable only on the grounds that in this paper these five worm infections are compared to one another in all their aspects.

During the three years, 1941-1943, 518 children infected with intestinal parasites were admitted to the paediatric wards of the Gorgas Hospital (Panama Canal Zone). For the purpose of this analysis, to this number were added 100 out-patients infected with *Enterobius vermicularis*. Of these 618 children, 457 were infected with one species of worm, and 161 with worms of two or more species. The parasite infections discovered in the 518 hospital patients were ascariasis (197), ankylostomiasis (175), trichuriasis (153), oxyuriasis (115), and

... mestizo), socio-economic level, ... linked, showed that oxyuriasis ... er economic status, living in sanitary government quarters (80.5 per cent. of infections were in white children), whereas with ascariasis, trichuriasis and ankylostomiasis the reverse was the case and only 5.6, 6.0 and 5.6 per cent. of infections respectively were in white children. Poly-parasitism was largely confined to the mestizo living in the rural districts or insanitary outskirts of towns.

Age incidence varied with the different worms. Few infections were noted in the first year of life. The peak years for ascariasis were 1 to 3, for oxyuriasis 2 to 4, and for ankylostomiasis 6 to 9, but trichuriasis was fairly evenly distributed over the first nine years. Boys predominated except in the case of oxyuriasis (50 per cent.) and strongyloidiasis (45.4 per cent.), but of the latter there were only 11 cases with this infection alone.

The characteristic clinical feature of the various infections can be explained by considering the point of attack of each parasite. *Enterobius* produces symptoms by wandering outside the anal canal and irritating the surrounding

tends to assume the form associated with the dominant infection. Convulsions were observed only in ascariasis and oxyuriasis, on 11 occasions in all.

The blood picture was not characteristic in any infections; there was usually anaemia in ankylostomiasis, and sometimes in severe strongyloidiasis and trichuriasis. The total leucocyte count remained within the normal range, and eosinophilia over 4 per cent. was noted in only 69 children (11.2 per cent.).

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ZERCHANINOV L K & BILICHEVA N A Helminth Fauna of the Workers of Coal Mines Med Parasit & Parasitic Dis Moscow 1946 v 15 No 1 66-7 In Russian

The authors record the results of a helminthological survey among Ural coal miners 313 of whom were examined in 1940-1941 both by faecal smears and by Fulleborn's method. Helminths

distributed as follows: *Trichuris*

Enterobius vermicularis 147 *Taenia*

bothrium latum 18 (the last named

The present findings are compared with the results of previous surveys among

Soviet miners which are set out in tabular form as introduced from outside)

se of the Ural

ected with the

C A Hoare

PINTO C Sobre um foco de esquistosomíase mansoni em culturas de agrão (*Nasturtium officinale*) na cidade de Santos [A Focus of Schistosomiasis mansoni in Watercress Gardens in Santos (Rio de Janeiro)] *Rev Brasileira Med* Rio de Janeiro 1945 Oct v 2 No 10 820-23 3 figs English summary

In a marshy uncultivated area close to the fine modern hospital of Santa Casa de Misericórdia there are gardens for growing watercress (*Nasturtium officinale*) which is sold to the public and consumed locally in the Saboo quarter of the town of Santos. Examination of 1126 persons chiefly school-children living there showed that 105 (9.3 per cent) were passing ova of *S. mansoni*. The watercress was grown in shallow trenches into which was directed the faeces of the inhabitants or the faeces were collected into a sunken receptacle which was then emptied into the trenches. Numbers of snails present were identified as *Anstratorbis glabratus*. Though 400 of these were dissected no evolutionary form of the schistosome could be detected nevertheless it is believed that it is through them that those who plant, gather or eat the watercress become infested.

H Harold Scott

PINTO C & DE ALMEIDA A F Epidemiologia da esquistosomíase mansoni no Brasil [Epidemiology of *S. mansoni* in Brazil] *Rev Brasileira Med* Rio de Janeiro 1945 Nov v 2 No 11 912-18 2 graphs [12 refs.] English summary

Among the many persons whose occupations render them liable to infestation by *S. mansoni*—washwomen children playing in streams operators engaged in bridge-building railway constructors topographers engineers fishermen etc.—the authors mention those who work with the *Eucrema lobata* (a tree some 10 feet high) stand for Workers with it are occup as well as adults tion is the cultivation of

watercress. [On this one of the authors (C. Pinto) has written another paper, see above.] The intermediate hosts are *Australorbis olivaceus*, and *A. glabratus*. Examination of these snails in polluted canals of various municipalities of Minas Geraes revealed a high percentage with forked cercariae. Of more than 4,000 examined in Itambacuri, 45.5 per cent. were positive; in one collection of 720 there were 584 infected (81 per cent.).
H. Harold Scott.

JONES, Myrna F. & BRADY, F. J. The Removal of the Cercariae of *Schistosoma mansoni* from Water by Filtration through Diatomaceous Silica in a Small Model Filter. *Pub. Health Rep.* Wash. 1946, Oct. 25, v. 61, No. 43, 1538-43, 1 pl.

"Tests were made to determine the efficiency of a small model diatomaceous silica filter in the removal of the cercariae of *Schistosoma mansoni* from raw water. Cercariae added to the precoat solution were found to be present in the water passing the filter for as long as 12 minutes after the beginning of recirculation even though the filtered water appeared to be visibly free from turbidity within 1 minute after the beginning of recirculation.

"When the cercariae were added to the influent water after the diatomaceous silica had been deposited on the diaphragm, none was recovered in the effluent in any of nine experiments in spite of the use of three grades of diatomaceous silica, the use of low and high pressures, and the use of slow and rapid filtration rates."

COWPER, S. G. Some Notes on the Maintenance and Breeding of *Schistosoma* Vectors in Great Britain, with special reference to *Planorbis guadalupensis* Sowerby. *Ann. Trop. Med. & Parasit.* 1946, July, v. 40, No. 2, 163-70, 4 figs.

Dr. Cowper begins his paper by pointing out that any extensive programme of chemotherapeutic research on schistosomiasis, outside the endemic areas, involves the establishment of a vigorous stock of one or more species of the molluscan vectors. In addition, although not mentioned by the author, such strains are necessary for the study of conditions or substances likely to prove lethal to the snails or the cercariae escaping from previously infected specimens.

The reviewer has often been struck by the paucity of existing knowledge concerning even the most important molluscan vectors of disease, as compared with that concerning most arthropod vectors. Thus, *Fasciola hepatica* infection in sheep and cattle is common in Britain, and must cost this country, at a moderate estimate, not less than half a million pounds a year. Nevertheless, the literature concerning the vector, *Limnaea truncatula*, can only be described as meagre. Under these circumstances Dr. Cowper's notes on the technique of maintaining and breeding *Bulinus truncatus*, *Planorbis boissyi* and *Planorbis guadalupensis*, together with his account of the bionomics of the last species, should prove of considerable value to workers in veterinary as well as in medical helminthology.
R. M. Gordon.

GRAM, Eloise B. & FILES, Virginia S. Laboratory Studies on the Snail Host of *Schistosoma mansoni*. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 3, 715-20.

"Nine additional species and subspecies of native American planorbids have been exposed to infection with *Schistosoma mansoni*, with negative results; additional attempts have been made to infect certain species which had been tested earlier

"Additional laboratory studies have been conducted with a species of *Tropicorbis* which has proved susceptible to infection. To date, 9 specimens

have been infected all of these snails came or were progeny of snails which came from a lake on the campus of Louisiana State University at Baton Rouge Louisiana. Subsequent to exposure of 22 wild adult specimens and of 77 laboratory reared juveniles 2 and 7 snails respectively or 9 per cent shed cercariae of *S. mansoni*. On the other hand there are described unsuccessful attempts to infect tropicorbirds which however appear to be different species and which were collected from two different sites.

KIESER J. A. Rooiwater (Bilharziasis) Beskrywing van n Geval met Dubbele Besmetting {Double Bilharzia Infection. *South African Med J* 1946 Oct 26 v 20 No 20 627-8 1 fig. [Summary in English by the author]}

1 A case of dual infection with *S. haematobium* and *S. mansoni* of the bladder and the rectum is described. The infection was contracted near Pretoria.
2 The case history is not typical and the probable cause of the symptoms

4 The case was kept under observation for a year and showed no signs of recurrence.

BOECHAT W. V. Appendicite esquistosomica. *Schistosoma Appendicitis* }
Brasil Medico 1946 Aug 17 24 & 31 v 60 Nos 33 34 & 35 277-80
3 figs [14 refs.] English summary

should be complementary to appendicectomy, and where possible the diagnosis should be confirmed by histo-pathological examination of the appendix.

In support of these recommendations the author presents clinical details of a patient in whose appendix *S. mansoni* was found. The histo-pathological changes are illustrated by three photographs. H. J. O. D. Burke-Gaffney.

HERNÁNDEZ MORALES F. SÁNCHEZ R. V. PRATT Caroline K. & OLIVER GONZÁLEZ J. Treatment of Schistosomiasis Mansoni with Antimony Lithium Thiomalate (Anthiomaline). *Puerto Rico J. Pub Health & Trop Med* 1946 June v 21 No 4 336-43 3 charts. [Spanish version 344 9]

The authors set out to discover whether Anthiomaline (Merck) would produce a higher proportion of cures of *S. mansoni* infections than Fouadin and tartar emetic.

They treated 40 patients suffering from intestinal bilharziasis caused by

¹ Sixteen patients were kept under observation in hospital and twenty four were treated in the out patient clinic. Full records were kept and the egg content of the faeces was estimated by a technique devised by one of the authors which adopts some of the features of the Stoll technique for hookworm ova. The technique which involved counting the ova in the sediment of a strained suspension of faeces in water is described in full.

Results of Anthelmintic Treatment of Patients infected with *Schistosoma mansoni*.

Number of Patients receiving Drug	Place of Treatment		Administration of Drug		Number of Patients in which Drug was discontinued because of Toxic Reactions	Toxic Reactions	Amount Administered	Number of Days necessary for Disappearance of Ova, after Treatment was Commenced
	O.P.D.	Hosp.	Daily	Every other Day				
7		x	x		4	High fever in 1 Some fever in 2 Albuminuria in 2	24-45 cc.	10-33
9		x		x	3	Fever in 5 Congestion of conjunctival vessels in 3 Mild muscular and joint pains in all	20-48 cc.	10-11
24	x			x	1	General weakness in 1 Dizziness, headache, epigastric pain, and precordial discomfort in 1 Pronounced joint pains in 1 Bradycardia of 40 beats per minute in 1	12-45 cc.	Not determined

All but one of the 16 hospital patients were males between 14 and 28 years. Daily doses of Anthiomaline were given to 7 of them and in 9 patients it was administered every other day. After preliminary trials with 2 cc the initial dose was standardized at 3 cc.

In the case of the group of 9 patients (treated on alternate days) no serious toxic reactions were observed. The reactions seen were slight pyrexia (3), some conjunctival congestion (3), mild muscular and joint pains (all).

Only 3 of the 7 patients receiving the drug daily were able to tolerate the total dose of 45 cc. The toxic reactions noted were fever between 100°-103°F (3) and slight albuminuria (2) after 24 to 36 cc.

The 24 out patients also received 3 cc every other day. Four patients were unable to complete the course owing to general weakness (1), dizziness, headache, epigastric pain and praecordial discomfort (1), pronounced joint pains (1) and bradycardia (1) after 28, 12, 24 and 36 cc respectively.

A progressive eosinophilia (53 per cent in two cases) was noted during treatment.

The results are summarized in the table above.

The author concludes that Anthiomaline in 3 cc doses intramuscularly every other day is markedly parasitotropic against *S. mansoni* and rarely produces toxic reactions of a serious nature.

H. J. O. D. Burke Gaffney

HALAWANI A. & ABDALLAH A. Intensive Treatment of Schistosomiasis with Repodral. A Preliminary Report on Fifteen Cases. *J. Roy. Egyptian Med. Ass.* 1946 Mar & Apr, 29 Nos 3/4, 101-21.

A number of intensive methods for shortening the course of treatment of schistosomiasis with antimony have been devised and these include the use of different preparations, increasing the size or frequency of the dose, or altering the route of administration.

The authors quote MILLS [this *Bulletin* 1946 v 43, 346] who gave Stibophen (B. W. & Co.) (=Fouadin, Bayer) or Anthiomaline (M. & B.) for six days during two successive weeks, and ALVES and BLAIR [this *Bulletin* 1946 v 43, 344] who used sodium antimonyl tartrate three times daily in intravenous injections at three hourly intervals on each of two successive days. These workers considered that slow and steady injection was of fundamental importance; there was a striking absence of the more troublesome effects of intravenous injections of antimony, but occasionally moderate reactions were encountered.

The present authors have employed Repodral (Winthrop, U.S.A.) in the intensive treatment of schistosomiasis. This preparation is stated to be identical with Fouadin and to contain 13.5 per cent of antimony, hence 1 cc of the 6.3 per cent solution represents 8.5 mgm of trivalent antimony.

The authors found by experiment that the total dose required for intensive treatment was about 0.5 cc per kgm of body weight. They gave it in 6 injections of 5 cc each at three hourly intervals three times daily on two successive days, thus administering a total dose for an adult weighing 60 kgm of 200 mgm, as compared with 264 mgm which is the amount present in 12 grains of sodium antimonyl tartrate.

This treatment was given to 15 selected adult males suffering from *S. haematobium* infections. Liver and kidney function tests and electrocardiograph investigations were made before treatment began. The urine was examined daily for a month and all laboratory examinations were repeated two weeks after treatment, since it was found that sometimes living ova disappeared after eleven days.

Cure was obtained in 11 (73.5 per cent) of cases. Alves and Blair obtained 100 per cent cure by means of their intensive method. The present authors

consider nevertheless that Repodral is less toxic than tartar emetic, and fear that, with the prevalence of bilharzial cirrhosis and nutritional deficiencies in Egypt, the average Egyptian patient might not tolerate intensive treatment with the latter drug.

The four cases which were not cured improved considerably.

Toxic symptoms were not severe, and in no case did reactions cause the treatment to be abandoned. No deleterious effect on previously normal livers or kidneys, nor on the pulse rate and blood-pressure, were observed.

The results of treatment are summarized in a table, and detailed case-histories of all 15 patients are given.

H. J. O'D. Burke-Gaffney.

HAMMOUDA, M. Intensive Treatment of Bilharzia with Repodral and the Care of the Heart. *J. Roy. Egyptian Med. Ass.* 1946, Mar. & Apr., v. 29, Nos. 3/4, 122-7, 2 figs.

The author studied the hearts of those patients treated with Repodral by HALAWANI [above].

The drug was first given 'oeyed
in the case of human pa after
each day's treatment and
after severe muscular exercise

In the case of human patients, treatment was only begun when the patient, who was kept in bed, showed normal liver and kidney function and a haemoglobin percentage of over 60. E.C.G. readings were taken during rest and after standard exercise. Treatment was commenced and, after the two days' course of Repodral, the patient was brought by ambulance for the E.C.G. readings which were again taken during rest and after exercise. He was not allowed to walk until the E.C.G. reading became normal, which usually took 4 or 5 days.

The results appeared to be very satisfactory when these precautions were taken. Two tables illustrate typical E.C.G. readings in dogs and men. The author tried Repodral treatment controlled by E.C.G. readings, on two school-boys, aged 12 and 15 years, who were suffering from haematuria, with schistosome ova in the urine. The results were satisfactory, the urine becoming free from living ova on the 12th day. "They both supported the treatment very well without nausea and vomiting."

H. J. O'D. Burke-Gaffney.

CAWSTON, F. G. The Control of Schistosomiasis with due consideration of the Destruction of Larvae. *Acta Med. Scandinavica.* 1946, Nov. 9, v. 126, Nos. 2/3, 237-40, 1 fig.

DICKMANN, G. H. Cisticercosis de la fosa craneana posterior (4 casos). [Cysticercosis of the Posterior Cranial Fossa.] *Prensa Méd. Argentina.* 1946, Aug. 9, v. 33, No. 32, 1628-38, 6 figs. [28 refs.]

Human cysticercosis is much rarer in the Argentine than in some parts of America, Chile and Mexico for example. The author has been able to find only 11 cases recorded of extraneural localization and 10 of invasion of the central nervous system. Of the latter, 6 were discovered at autopsy, 2 by lumbar puncture and 2 at operation. Of course, if they are cretified X-rays would demonstrate them.

He now puts on record four cases under
before operation, three showed free vt
other in the fourth ventricle. There are
and apoplectic fits, psychic disturbances and meningeal symptoms are not
peculiar to cysticercosis. The colloidal benzoin reaction is positive in this but

also in cases of cerebral tumour in disseminated sclerosis encephalitis etc.
 Ec
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was cured by operation others were a man of 33 who died some 7 weeks after
 operation a man of 38 who became practically normal after the operation
 ional vomiting and headache the fourth
 who also made a good ultimate recovery
 m of headache nausea and vomiting on
 standing partially or completely relieved on lying down H Harold Scott

WATSON J M Helminths Infective to Man in the Syrian Hamster [Memoran
 da] Brit Med J 1946 Oct 19 578 [10 refs]

ion in laboratory workers
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of hamsters used for experimental infection of kala azar in the Wellcome
 used *post mortem* a number

[thus Bulletin 1937 v 34 878] were taken from each person and examined
 respectively for ova of *H. nana* and *S. obvelata*

All the specimens were negative and since no special precautions had been
 taken in handling the hamsters it would seem that the risk of infection to
 laboratory workers and to animal house staff is not great

H J O D Burke Gaffney

LARSH J E Jr A Comparative Study of *Hymenolepis* in White Mice and
 Golden Hamsters. J Parasitology 1946 Oct v 32 No 5 477-9

of *H. nana* var *fraterna* were compared in white
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BRIOR J Diagnos
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most of which has been abstracted in this *Bulletin*, indicates that extracts of many different species of tapeworm may be used, because group reactions occur. The author washed the cestode in running water, rinsed it in sterile water, dried it at 37°C. for 24 to 48 hours and titrated the dried material, making a 1 per cent. suspension of the powder thus obtained in normal saline phenolized to 0.5 per cent. This suspension was kept at 37°C. for 2 hours and then centrifuged, the supernatant fluid being used as the antigen, of which 0.1 cc. was injected under the skin, controls being done with normal saline phenolized to 0.5 per cent.

Reactions were sometimes immediately positive and were always more intense than those obtained with hydatid fluid; they also persisted longer and were often pruriginous. Some positive reactions were obtained in subjects from whom the "Taenia" had been removed more than six months previously. The author analysed the antigen chemically and found in it —

1. A protein fraction precipitated by trichloroacetic acid;
2. A polysaccharide fraction, which is the most important element in the antigen. This gives a strongly positive Molisch reaction, is insensitive to acid hydrolysis, but is easily decomposed by emulsion.

"This fraction contains, after hydrolysis, 40 per cent. of reducing sugar expressed as glucose." The author quotes work which records the isolation of polysaccharide substances from *Ascaris lumbricoides*, *Necator americanus*, *Trichinella spiralis*, *Schistosoma mansoni*, *Cysticercus cellulosae*, the larval stages of *Taenia solium* and other species [cf. OLIVER-GONZÁLEZ and TORREGROSA, this *Bulletin*, 1945, v. 42, 45; CULBERTSON and ROSE, *ibid.* 1942, v. 39, 95, and other papers abstracted in this *Bulletin*.]

The author then very briefly discusses the relationships between antigens derived from helminths and the blood-group iso-agglutinins [cf. the more detailed discussion of this subject by OLIVER-GONZÁLEZ, below, p. 226]. The author's general conclusions are that it is possible to obtain from any species of cestode an antigen of known strength which can be used for skin tests. Its specificity is of the same order as that of antigen obtained from hydatid fluid, but it is stable and produces positive reactions which are usually strong and easy to read; but it is necessary to know whether the subject had suffered previously or not from "taeniasis". The essential part of this antigen is the polysaccharide fraction joined to a distinct protein fraction, so that it has a composition similar to that of various other helminth antigens and to that of erythrocytes and even of certain bacilli (e.g. the Shiga bacillus) or of blood parasites.

SHAW, H. M. A Case of Hydatid Disease of the Thyroid Gland. *Med. J. Australia*. 1946, Sept 21, v. 2, No. 12, 413-14, 1 fig.

BADO, J. L. Apuntes sobre equinococosis ósea. [Echinococcal Cysts of Bone.] *Dia Médico*. 1946, June 24, v. 18, No. 25, 762-4, 766.

Fortunately, localization of *Echinococcus* in bony structures is rare, for treatment is difficult and often unsatisfactory. It used to be said that if bone was affected other structures and organs escaped, but this is not true. When bones are invaded the commonest sites are the upper ends of the femur, tibia or humerus, the vertebrae and the ribs. The primary site may, however, be diaphysis or epiphysis, whence growth, slow and insidious, progresses. In the former case, in its growth it causes destruction of the trabeculae, molecular necrosis, thinning of the bone and finally spontaneous fracture. If the epiphysis is invaded, the interarticular cartilages usually escape and the tumour is hour-glass-shaped, passing over to invade the epiphysis of the contiguous bone.

[February 1947]

Growth is very slow. Biological tests are not very reliable and the best diagnostic means is X rays and as a last resource puncture [but there is a grave risk of tearing up the wall and dispersion of the scolices]. The only treatment is surgical and for successful results that must be undertaken as early as possible.

H Harold Scott

PETERSON J ARBONA G & ACOSTA Josefina Hookworm Infestation in a Small Town of Puerto Rico *Puerto Rico J Pub Health & Trop Med* 1946 Sept 22 No 1 48-57 2 charts Spanish version 58-65

KAMALOV N G GORDADZE G & TSUTSLUNAVA T & KHIZANISHVILI A O of Ankylostomiasis *Med Parasit & Parasitic Dis* Moscow 1946 15 No 1 55-65 5 figs [In Russian]

The authors have undertaken an anti helminthic campaign in a selected village of Georgia representing an endemic focus of ankylostomiasis. The total incidence of helminthic infection among the 771 inhabitants of this village was 97.3 per cent of whom 64.9 harboured ankylostomids 82.8 ascarids and 89.5 *Triculus*. The mean density of invasion with hookworms was 548 eggs per 1 gm of faeces. The main epidemiological factor in the village was the constant contamination of the soil due to almost complete absence of proper latrines to abundant and frequent rains as well as to fertilization of domestic animals and orchards with fresh faeces. The campaign against hookworm disease consisted on the one hand of improvements in sanitation chiefly by provision of well planned latrines and on the other hand of drug treatment. The latter was carried out exclusively with carbon tetrachloride which had a good therapeutic effect. As a result of these measures there was a sharp drop in the incidence of hookworm infection from 64.9 per cent in December 1937 to 23.1 in May 1938 to 10.1 in December 1938 to 3.1 in December 1939 and finally to 6.5 in December 1940 while the mean number of ova per gramme of faeces for the same periods was 548 102 48 49 and 62.

C I Hoare

WRIGHT D O & GOLD E W Löffler's Syndrome associated with Creeping Eruption (Cutaneous Helminthiasis) *Report of Twenty-Six Cases* *Arch Intern Med* 1946 Sept 78 No 3 303-12 3 figs Refs in footnote:

In August 1945 the authors published an account of nine cases of Löffler's syndrome associated with creeping eruption thought to be due to larvae of *A. brahieri* of which the natural hosts are the dog and the cat [see this Bulletin 1945 42 1041]. They now put on record 17 more making 26 instances in which the Löffler syndrome has been found by them among a total of 76 cases of creeping eruption.

Blood smears examined every third day showed an eosinophil range up to 51 per cent and in the sputum up to 90 per cent in each the degree ran fairly parallel with the pulmonary consolidation but persisted after the lung signs subsided. The pulmonary infiltrations were patchy and also migratory. In no case were helminthic ova present in the faeces (one had *Necator americanus* ova but the pulmonary signs did not develop in this man) nor in the sputum in the course of 351 examinations.

Three possibilities are suggested in explanation of the association —

- 1 That the pulmonary infiltrations result from larval migration in the
- 2 That the larvae reach the lungs and die there and the

bowel and are not found in the faeces.

3. That, since the intradermal reaction to *A. lumbricoides* and *Trichinella spiralis* are positive, the lung infiltrations are due to allergy to blood-borne antigens from the larvae in the skin.

The absence of larvae from stools and sputum lend support to the third view.

H. Harold Scott.

PIERAERTS, G. Étude sur le syndrome dépigmentation-oedème au Kasai. [A Syndrome of Pigmentation and Oedema In Kasai.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 5/6, 226-35 [48 refs.]

This is in the main a recapitulation of the views expressed by the author in 1942 [see this *Bulletin*, 1942, v. 39, 99, and 1943, v. 40, 406]. That paper was outstanding for its observations on the distribution of the disease "diboba", and on the relation of the disease to iron deficiency in the Belgian Congo. The disease is described in East Africa by GILLAN [see this *Bulletin*, 1935, v. 32, 71], TROWELL (1937) and others, but to be slightly different from kwashiorkor in West Africa, for references to which see GELFAND, below, p. 232 [The basis for this distinction is not clear, since in both the West and East African diseases there is anaemia, oedema and depigmentation. Dermatitis is a prominent part of both syndromes, whereas in "diboba" skin lesions are usually absent, or if present are considered to be secondary and non-specific.]

In discussing the aetiology of "diboba", the author states that iron, or an iron-copper co-enzyme, is deficient in the disease. In deficiency of iron, the enzyme dopa-oxidase is deficient, leading to iron deficiency. In deficiency of iron, the enzyme ankylostomiasis. It is recognized, however, that it is not only iron which is lacking; the absence of protein from the diet is the "generic characteristic", as the author puts it, of this and allied deficiency states.

[No references are given to support the statement that iron plays a part in melanogenesis. The theory that the syndrome is caused by iron deficiency was suggested by the empirical finding, reported in the author's earlier paper, of the return of normal pigmentation, as well as improvement in anaemia and oedema, as a result of treatment with iron and anthelmintics.]

J. C. Waterlow.

SWARTZWELDER, J. C. Clinical Ascariasis. An Analysis of Two Hundred and Two Cases. *Amer. J. Dis. Children.* 1946, Aug., v. 72, No. 2, 172-80.

Ascariasis is relatively common in New Orleans: of 11,000 stools examined by the author and his colleagues, 426 contained the ova of *Ascaris lumbricoides*. An analysis is made of the data from 202 Charity Hospital patients in whom *Ascaris* was the only parasitic infection (a few with light *Trichuris trichiura* infections were not excluded) and in whom all the symptoms could be attributed to this infection.

Of the 202 patients, 170 were under 16 years of age and 76 were under 6; the age group showing the maximum was that between 2 and 3 years, in which there were 33 patients. Fifteen patients were over 30 years of age.

Thirty per cent. were Negroes, whereas about half the patients in the Charity Hospital are Negroes. There is thus an actual predominance of white patients; this observation surprised the author, but is in keeping with his experience with clinical trichuriasis in this area [see SWARTZWELDER, this *Bulletin*, 1940, v. 37, 660]. There was no significant sex or seasonal distribution.

The chief complaints for which the patients were admitted to hospital were abdominal pain or discomfort (112) passage of worms (30) fever (34) vomiting (32) convulsions (19) cough or cold (16) diarrhoea (11) and constipation (9). Fifteen other complaints are listed these include jaundice and haemoptysis (once each).

The predominant physical signs observed in hospital were rise of temperature (98) abdominal pain (71) abdominal distension (50) abnormal pulmonary conditions (23) abdominal rigidity (9) and palpable mass in abdomen (9).

The abdominal pain usually appeared suddenly and was most frequently in the epigastrium or the region of the umbilicus but in 17 cases it was in the right lower quadrant.

The fever was above 101°F in 33 cases respiratory signs were absent in most of these. The temperature was between 99.1 and 101°F in 60 cases.

Intestinal obstruction occurred in 18 cases in 16 of these prior to treatment. Six of these patients died two following treatment (santonin and carbon tetrachloride).

Tentative diagnoses included intestinal parasites (117) *Ascaris* infection (42) chronic recurrent appendicitis (30) infection of upper respiratory tract (18) gastro-enteritis (16) intestinal obstruction (14) and tuberculosis (10). Twenty nine other diagnoses were made but none more than 7 times these included epilepsy (7) typhoid (2) malaria (2) and neuro-circulatory asthenia (1).

The red cell counts and haemoglobin estimations were done only in 30 and 22 cases respectively but the patients were not representative of the group. Anaemia was not a striking feature.

In 64 white blood cell counts the total count exceeded 10 000 per cmm in 14 in 12 the eosinophil percentage exceeded 6 and in 36 cases it was less than 3 per cent. The maximum eosinophil count was 28 per cent.

L. E. Napier

OLIVER GONZÁLEZ J. Functional Antigens in Helminths. *J. Infect. Dis.* 1946 May-June v. 78 No. 3 232-7. 1 fig. [10 refs.]

Earlier work quoted by the author has shown that the antigens which produce immunity against nematode infestations are only a few of those which are present in the nematodes and that these other antigens play no part in the production of the immunity. In this paper the author describes his investigation of the functions of the non immunizing antigens present in *Ascaris lumbricoides*. He has shown (this *Bulletin* 1944 v. 41 223) by means of the precipitates formed around larvae of *A. lumbricoides* placed in immune sera that the antigens which provoke anti-parasitic factors against *A. lumbricoides* are apparently present only in the egg tissue of this species and not in the material obtained from its cuticle, sperm, muscle, intestine and coelomic fluid.

For the present work male rabbits only were used weighing 3 000 to 4 000 gm and also male and female guinea-pigs weighing 300 to 400 gm. The agglutination tests were done by mixing 0.1 ml of undiluted serum and of serum diluted 1:2, 1:4, 1:8 etc. with equal volumes of 2 per cent suspension of washed erythrocytes freshly obtained and washed three times in normal saline. The mixtures were put in the water bath at 37°C for 30 minutes and then overnight in the ice box at 6°C. The agglutination titres were then ascertained by microscopic examination of the mixtures after exposure at temperatures of 37° and 6°C respectively.

Precipitin titrations were carried out by the disk technique using undiluted sera overlaid with dilutions of 1:100, 1:200, 1:400, 1:800 etc. of the adult

Ascaris antigen. The dried tissues and infective eggs were obtained by the technique described by González (*loc. cit.* above).

Experiment 1 was designed to elucidate the effect of infestation with *A. lumbricoides* on rabbit blood agglutinins. The rabbits used lacked Group A substance in their erythrocytes. Four rabbits were given 20,000 infective eggs of *A. lumbricoides* by stomach tube and 35 days later were re-infested with another dose of 20,000 or more eggs. They were bled 7 days before the first dose of eggs and every 7th day throughout the experiment. The sera obtained were tested for $\alpha 1$, $\alpha 2$, β and anti-O iso-agglutinins and for cold agglutinins. Precipitin titres of the sera were also determined with extract of whole *A. lumbricoides*. During the 35 days after the first dose of eggs there were no significant changes in the titres of the $\alpha 1$ and $\alpha 2$ agglutinins, but these were markedly increased after the second dose of egg e.g. the $\alpha 1$ titre rose from 1.64 to 1.65,536 on the 7th day after re-infection with the second dose of eggs and the $\alpha 2$ titre rose from 1.16 to 1:2,048. Precipitin reactions to extract of whole *Ascaris* rose from the 7th day after the first dose of eggs and remained high. The titres of the β and anti-O agglutinins were not significantly altered throughout. The titres of the agglutinins of the normal rabbit sera used were low. Before the cold agglutinins could be studied the $\alpha 1$, and $\alpha 2$, β and anti-O agglutinins which act at 37°C had to be absorbed from the sera. This was done by treating the sera with fresh erythrocytes of the homologous groups; but no significant increase of the cold agglutinins could be detected after the two doses of *Ascaris* eggs and there was no significant variation of the titres of the cold agglutinins for the various blood groups.

For tests of the absorption of iso-agglutinins and cold agglutinins with isolated tissues of *A. lumbricoides* enough dried and powdered material from the various tissues of *Ascaris* (cuticle, sperm, muscle, intestine and coelomic fluid) was added to small portions of rabbit sera to make 4 per cent. suspensions. These mixtures were incubated at 37°C. for 1 hour, shaken often and left in the ice box overnight. It was found that treatment of the sera with cuticle material reduced the titres of the $\alpha 1$, $\alpha 2$ and β agglutinins, but the material from the other tissues had no effect. But each tissue reduced to the same extent the titres of the cold agglutinins for A, B and O cells.

For the detection of anaphylactogen in ascarid tissues 12 guineapigs divided into 6 lots were fed by stomach tube with 5,000 infective eggs of *A. lumbricoides*. On the 8th day after feeding these an intravenous injection of an extract of one of the *Ascaris* tissues mentioned above was given to each of the guineapigs. Intraperitoneal injections of 5 ml. of serum from rabbits artificially immunized with whole adult *Ascaris* material (passive sensitization) were given to 12 other guineapigs and 48 hours after the injection of this anti-ascaris serum the guineapigs were given intravenous injections of extracts of the various *Ascaris* tissues, just as the other 12 were. When coelomic fluid or extract of intestine material was injected, anaphylactic reactions (restlessness, sneezing, roughing of the fur, discharge of urine and faeces) were observed in all the guineapigs sensitized to *Ascaris* either by injection or by passive sensitization, the reactions produced by the coelomic fluid being the more severe (one guineapig died from shock); but no anaphylactic reactions were observed when extracts of the other tissues (cuticle, muscle, sperm and egg) were injected.

Discussing his results the author points out that CAMPBELL (*J. Infect. Dis.*, 1939, v. 65, 12) isolated a polysaccharide substance from *A. lumbricoides* which acts as a complete antigen, and that GONZÁLEZ (*J. Infect. Dis.*, 1944, v. 74, 81) isolated a polysaccharide substance immunologically similar to the substance which determines the blood groups of man from *A. lumbricoides*. *Trichinella spiralis*, *Schistosoma mansoni* and *Necator americanus*, which, when it is added to human sera, inhibits the α and β agglutinins.

Gonzalez claims that the experiments described above indicate that rabbits infested with *Ascaris* are not immunized against this substance after a first infestation but are immunized against it after a second infestation. The β and anti O agglutinins were however not altered. Although the $\alpha 2$ agglutinins of man are not specific for A2 cells but also react with all Group O erythrocytes no reaction was noted between the agglutinins in rabbit serum and the Group O cells. The reaction of the $\alpha 2$ agglutinins is however more intense with A2 than with O cells so that it is possible that repeated reinfestation would have revealed a reaction with the O cells.

Although the polysaccharide isolated from *Ascaris* inhibits β agglutinins as well as $\alpha 1$ and $\alpha 2$ agglutinins in human sera it had no effect on the titre of rabbit β agglutinins. The reason for this may be that the polysaccharide is common to both A and B agglutinogens but that infestation produces agglutinins against A substance only. This was suggested by the author (OLIVER GONZÁLEZ *J Infect Dis* 1944 v 74 81) who surmised (*Proc Soc Exper Biol & Med* 1944 v 57 25) that an iso agglutinin like substance may be present in the malarial parasite. Immunization of the host may then cause the development of auto agglutinins for the host's erythrocytes the agglutination of which may be followed by intravascular haemolysis as observed in blackwater fever. The author discusses the interesting observations that the increase of the iso agglutinin titre during infection with animal parasites seems to be limited to the $\alpha 1$ and $\alpha 2$ agglutinins just as it is in rabbits infested with *Ascaris* and the fact that blackwater fever occurs to a higher degree in certain families. He suggests that the occurrence of the host with the iso-agglutinin like substance may lead to the formation of homologous $\alpha 1$ and $\alpha 2$ agglutinins auto-agglutination and haemolysis would occur in individuals with the blood groups A1 A2 and O. If the iso agglutinins lead to pathological changes only among individuals of certain blood groups during infection of man with various organisms the relationship between the genetic constitution and natural immunity may be better understood and individuals with a genetic constitution for specific agglutinogens will be the most susceptible to the pathological changes associated with the infection.

The author's failure to obtain an increase of cold agglutinins during infection with *Ascaris* agrees with the findings of other workers. DARRIN and WELLER [*this Bulletin* 1945 v 42 941] found that the titre of cold agglutinins did not exceed 1/10 in 303 out of 312 (97 per cent) of subjects with schistosomiasis filariasis and malaria and cold agglutinins have only been reported regularly in trypanosomiasis (see YORKE *Ann Trop Med & Parasit* 1911 v 4 509). Powerful cold agglutinins have however been reported without infection. During the above experiments each of the tissues of *Ascaris* substance had been added the cold agglutinins and it is possible that if more *Ascaris* substance had been added the cold agglutinins would have been completely absorbed.

The above results show that the coelomic fluid is the tissue which seems to be the most closely associated with anaphylaxis in the guinea pig and it is important to find out whether the coelomic fluid is also associated with human hypersensitivity to *Ascaris*.

G Lafage

HERNÁNDEZ MORALES F & GONZÁLEZ BARRIENTOS G. The Incidence of Filariasis at the Insular Penitentiary for Men. *Puerto Rico J Pub Health & Trop Med* 1946 Sept v 22 No 1 99 101 [Spanish version 102-5].

In a filariasis survey conducted at the Insular Penitentiary for Men night blood was obtained from 1,256 inmates and subsequently examined. Filariae were found in 57 or 4.5 per cent of them.

"Of the 57 positive cases, 40 were submitted to a physical examination in order to determine what evidences of filariasis there might be among them. Elephantiasis of the scrotum was observed in 1 and moderate thickening of the spermatic cord in another; whether or not this was of filarial origin is not conclusive. However, evidence of hydrocele was conspicuous in this group and in the 1,199 inmates negative for microfilariae. Only 9 histories of lymphangitis were obtained for the total group, however.

"If elephantiasis of the scrotum, thickening of the spermatic cord, recurrent attacks of lymphangitis, and hydrocele are considered evidence of filariasis, then the total incidence of the disease among the 1,256 prisoners examined was 13.6 per cent."

HERNÁNDEZ MORALES, F. & OLIVER GONZALEZ, J. Filariasis in Puerto Rico. A Note on Family Incidence. *Puerto Rico J. Pub. Health & Trop. Med.* 1946, Sept., v. 22, No. 1, 95-6 [Spanish version 97-8.]

NELSON, E. C., WEBB, J. E., BAYLISS, M. & STARKEY, G. S. Studies of Filariasis. Development of *Wuchereria bancrofti* in *Culex quinquefasciatus* of Oahu. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 707-13, 14 figs.

"Microfilariae of *Wuchereria bancrofti* from Okinawa develop readily into infective larvae in *Culex quinquefasciatus* of Oahu, Territory of Hawaii. Microfilariae of *Wuchereria malayi* from Koreans failed to develop in the same mosquito."

CULBERTSON, J. T. & PEARCE, Elizabeth. Chemotherapy of Filariasis (*Litomosoides carinii*) in the Cotton Rat by the Administration of Stibranose (Solustibosan). *J. Pharm. & Exper. Therap.* 1946, June, v. 87, No. 2, 181-4, 1 fig.

"The filaria (*Litomosoides carinii*) of the cotton rat can be eradicated from these animals by the repeated administration of the pentavalent antimony compound stibranose (or solustibosan). Because of the excellent tolerance man is known to have for this drug, its trial in the chemotherapy of human filariasis is strongly indicated."

DUBOIS, A. Prurigo et *Loa loa*. [Prurigo and *Loa loa*.] *Ann. Soc. Belge de Méd. Trop.* 1946, June 30, v. 26, No. 2, 109-10.

The occurrence of prurigo in two Europeans in the Belgian Congo was shown to be associated with *Loa loa* infestation. The first patient had been living, since 1932, in an area (Népoko) where *L. loa* is common. He had never had classical features of infection, nor was the parasite found, but in 1935 he had a

ing urticarial eruptions.

found in skin scarifica-

tions and in the blood. There was a 15 per cent. eosinophilia. Various forms of treatment produced little benefit.

The second patient lived in the same area. He had suffered from filarial oedema for 4 or 5 years, but had not had any for several years past. He once had a passing filarial infection in his eye. He had experienced pruritus since 1936. At the end of 1945, he showed a typical prurigo in the back and chest with considerable thickening of the skin. Examinations for *O. volvulus* were consistently negative. No parasites of any kind were found in a thick blood film.

In April 1946 thick films and centrifuged specimens of blood were still negative. There was a 21 per cent eosinophilia. Treatment by various means was not satisfactory.

The author points out that whilst it is difficult to exclude all the possible causes of the skin conditions it is noteworthy that they were subsequent to the development of the worm and in the second case persisted after every other sign of infestation except perhaps the eosinophilia.

H J O D Burke-Gaffney

CABALLERO Y C E. Estudios helmantologicos de la region oncocercosa de Mexico y de la Republica de Guatemala. *Nen aloda* 3a parte. *Filaroides* 11. El genero *Onchocerca* (An Inst Biol Mexico 1945 v 16 No 2 367-409 1 text fig & 39 figs on 3 pls [Bibliography]).

This includes details of *O. vol* this

VEGA C. Anotaciones Bibliograficas acerca de la Oncocercosis en Mexico y Guatemala, 1917 1945. (A Bibliography of Onchocerciasis in Mexico and Guatemala, 1917 1945) 20 pp 1946 Mexico Universidad Nacional Autonoma de Mexico

A useful bibliography of some 150 references

OLMERS H A & ZESSLER H. Pharmakologische Untersuchungen an Oxyuren [Pharmacological Studies on *Enterobius* Arch f Exper Path u Pharm 1942/43 v 200 518-27 (12 refs)]

See this Bulletin 1942 v 29 709

LEHMENSICK R. Ueber die Trichinose in der freien Wildbahn. (Weiterer Beitrag zur Epidemiologie der Trichinose) [Trichiniasis in Non-domesticated Animals] Zent f Bakt 1 Abt Orig 1942 Dec 8 v 149 No 6 338-44 1 fig

It is well known that man becomes infested with *Trichinella* from eating trichinosed pig meat but the knotty question is 'How does the pig become infected?' The author maintains that the infection is common among wild animals—foxes badgers—and that they transmit it to house rats and mice occasionally and these in turn may be devoured by the pig and through its flesh man becomes infested. He therefore arranged through the local huntsmen to have sent to him parts of any fox killed these parts to include especially the diaphragm and the base of the tongue. These were then examined by the trichinoscope and if none was seen rats were fed with the material. A month later the rats were killed and examined for trichiniasis. Of 137 sent thus from the Rhineland three were microscopically positive and two others set up infection in rats i.e. 3.4 per cent were positive. Also of 66 foxes sent in from other districts 10 were infested [the table states 11 but the addition is wrong] and of the other 56 2 or 3 more were found infested. Another table shows schematically how the rat and fox may pass on the disease to one another and the sequence might well be fox wild rat home rat pig man.

H Harold Scott

DEFICIENCY DISEASES.

CLARKE, B. L. W. Deficiency Diseases. *Med. J. Australia*. 1946, Aug. 3, v. 2, No. 5, 162-6.

This paper is a brief survey of the Australian prisoners-of-war in Singapore. It describes beriberi, nutritional oedema, the "pellagrous skin lesions, and ulceration of the skin after injury. Of particular interest is a syndrome which appeared to be an allergic reaction to a certain type of bean of the calabar variety. The initial symptom was burning or pricking of the skin, followed by oedema, which rapidly increased. Later the skin began to peel, leaving a raw bleeding surface. A most remarkable feature was severe agranulocytosis, the leucocyte count often falling to a few hundred cells per cmm. Other manifestations were swelling of the lips and tongue, ulceration of the buccal mucosae, and fissures at the corners of the mouth and round the anus. Many patients after recovery were left with patchy areas of depigmentation of the skin. No details are given of the mortality of this disease, nor of the response to different forms of treatment J. C. Waterlow.

LANG, W. R. Vitamin B Deficiency in Ex-Prisoners of War from Japan. *New Zealand Med. J.* 1946, Aug., v. 45, No. 248, 296-307. [15 refs.]

"An account is given of 83 servicemen who had been interned in Japan and who came to New Zealand suffering from beri-beri, pellagra, worm infestation, amoebiasis and other affections. Their state on admission, treatment and general management and progress are described, and three illustrative case histories reported. Attention is given particularly to Vitamin B deficiencies, and these are discussed and some conclusions drawn from the present series."

SIMONS, R. D. G. P. Pellagrosis (Morbus Strachan-Scotti of Dermoberiberi Castellani) onder Krijgsgevangenen op Java en Sumatra. [Pellagrosis in Prisoners of War in Java and Sumatra.] Reprinted from *Nederl. Tijdschr. v. Geneesk.* 1946, July 20, v. 90, No. 29, 843-7. English summary.

"Among a great number of Netherlands and British prisoners of war in Java and Sumatra vitamin deficiency was observed consisting of pellagra and some other symptoms which occurred simultaneously. STRACHAN, SCOTT and CASTELLANI previously mentioned syndromes consisting of similar symptoms."

"If one should wish to reserve the term of pellagra for the triad of KNOWLES (diarrhea, dermatosis and depression or dementia) another term is required e.g. pellagrosis, which includes the obsolete 'pellagra', Morbus CASTELLANI (dermoberiberi) and the disease of STRACHAN and SCOTT. The observed symptoms have been enumerated in this article."

SCHMIDT, V. Pantotensyre [Pantothenic Acid.] *Nordisk. Med.* 1946, Nov. 1, v. 32, No. 44, 2492-4. [Summary in English by the author.]

"A summary is given of the occurrence, chemistry, and physiology of pantothenic acid. Report is given of known pantoten deficiency symptoms in animals, compared to investigations into the occurrence, effect, and characteristics of pantoten in certain diseases in man. Special mention is made of GOPALAN's statements regarding the effect of pantothenic acid in the 'burning feet' syndrome. Finally, a review is given of pantothenic acid-antivitamin research."

GELFAND M Kwashiorkor *Chn Proc* Cape Town 1946 June 1
No 4 135 53 2 figs [18 refs]

In recent years increasingly frequent descriptions have appeared from
infantile
LLMAN
v 44
ypical
118] The cases reported
examples of the syndrome All were infants between one and two years old
with crazy pavement dermatosis fissures at the mucocutaneous junctions
and depigmentation of the skin and hair Wasting was severe oedema was
present in three quarters of the cases and the liver was usually enlarged
Steatorrhea was not always found but four cases examined radiologically
showed gross segmentation of barium in the jejunum BROWN & TROWELL
[this *Bulletin* 1945 v 44] was severe fatty
infiltration of the liver Dried stomach
was found to be of no value in patients who
received this substance died

The author maintains that kwashiorkor is not a nutritional disease His
argument may be summarized as follows the history is too short—usually
1 month—and the maximal incidence is just at the time of year

The fatty change in the liver is considered to be the primary feature of the
disease the other manifestations are secondary to interference with the meta-
bolism and storage of vitamins and other nutrients The liver lesion is ascribed
to the action of toxins and examples are given of cases not related to malnutri-
tion in which a similar degree of fatty infiltration was observed—namely
two infants dying after severe burns and one dying of miliary tuberculosis

the first is the failure
and is the suggestion that

GILLMAN & GILLMAN (1944) introduced the use of dried stomach in the
treatment of infantile pellagra They claimed that it acted as a specific cure

with this than with
ere also reported by
The failure of dried
dequate dosage 6

stomach in Gellman's cases but the reason for this was not made by Paines
GILLMAN &
Parke Davis)

obtained a good response with a much smaller dose (10 gm for 5 days)
This form of treatment is still in the experimental stage and therefore
differences in the preparation used must be taken into account in assessing the
contradictory results

Until the active factor in dried stomach if such there be is isolated the
aetiology of kwashiorkor remains in doubt It must be admitted that the
evidence that it is a deficiency disease is by no means complete This evidence
is derived from observations of two kinds the resemblance of some of the
features of the syndrome to those of known deficiency states and the general
conditions under which the disease is found There have however been few
detailed descriptions of the dietary background and no accurate records of

food intake, either in the patients themselves or in members of the same population. In spite of these gaps in our knowledge, the weight of opinion, in all parts of the world in which the disease occurs, is that it is the result of dietary deficiency. The evidence which Gelfand brings against this view is slender. A short history is of little significance, because it refers only to the duration of frank and obvious symptoms, which may have been preceded by a longer period of under-nutrition. The prodromal symptoms and signs—irritability, failure to thrive, etc.—are so common among infants of a generally malnourished population that they excite no comment. This point has been emphasized by TROWELL (this *Bulletin*, 1946, v. 43, 1062)

Since no details of the native diet are given, it is not possible to assess the significance of the seasonal incidence. PIERAERTS (this *Bulletin*, above, p. 225, and also 1942, v. 39, 99, and 1943, v. 40, 406) showed clearly that the similar, if not identical, disease "diboba" reaches epidemic proportions at the time of year when the diet is at its worst, consisting of manioc alone, with no cereal, greenstuffs, or animal food.

The statement that mild cases which respond to any form of treatment are really cases of acute gastro-enteritis raises the question "what are the diagnostic criteria of kwashiorkor?" In an earlier passage of this paper it was stated that cases without oedema are to be differentiated from gastro-enteritis by the presence of depigmentation. The borderline between kwashiorkor, marasmus and nutritional oedema of infants associated with gastro-enteritis, is not clearly defined. Until the aetiology is better understood the definition of what is and what is not kwashiorkor remains a matter of convention.]

J. C. Haterlow.

HYNES, M., ISHAQ, M. & MORRIS, T. L. Serum-Protein Level of Indian Soldiers. *Lancet*. 1946, Oct. 26, 590-94, 2 figs.

When the copper sulphate method was used to estimate serum proteins, it was found that the moderate exercise of marching one mile raised the average serum-protein level of Indian soldiers by 0.3 gm. per 100 ml., and in some individuals by thrice this amount. After 30 minutes' rest the protein fell to a stable resting level. Violent exercise for 5 minutes raised the average serum-protein level by 0.75 gm.; the resting level was not reached until an hour after. These findings emphasize the importance of taking blood for serum-protein estimations after a strictly standardized period of rest. No difference was found in the degree of change with exercise in recruits and trained men: the values in recruits were however higher than in trained men.

Similar alterations with exercise were found also in the level of the haemoglobin and in the volume of the packed red cells. Gentle exercise led to average increases of 0.4 gm. haemoglobin per 100 ml. blood, and 1 per cent. in the packed cell volume. Violent exercise gave average increases of 0.9 gm. Hb. and 4 per cent. packed cell volume. A discussion is given of the possible significance of these findings, which raise many interesting questions without providing the answers.

H. E. Harding.

SPRUE.

BLACK, D. A. K. Salt Deficiency in Sprue. *Lancet*. 1946, Nov. 9, 671-5.

In both tropical and non-tropical sprue blood-pressure is lower than normal. Though a fall in blood-pressure is more common in long-standing cases, in 41 soldiers with sprue who had been in India 4 years or less, four had a systolic

blood pressure of less than 100 mm Hg and a diastolic of less than 60 mm. Some of these showed signs of peripheral circulatory failure.

The ten patients investigated were selected from several hundreds who passed through the hospital in 15 months. The basis of selection was low pressure with asthenia. The pulse was thin and rapid. The muscles and subcutaneous tissues were flaccid, the skin wrinkled.

Seven of the patients had a *plasma volume* of less than 2.5 litres, two of less than 2.0 litres and five of less than 45 mgm/kg. The haematocrit readings lay mostly between 40 and 46 per cent. The *serum sodium* values were uniformly low, ranging from 258-320 mgm/100 ml. The *serum potassium* in seven patients did not exceed upper limit of normal. The *serum chlorides* were also low. All this indicated that hypotension and circulatory failure are associated with low serum sodium and serum chloride levels, less constantly with a low plasma volume.

In later patients of the series, treatment with salts, either by mouth or intravenously, was followed by disappearance of circulatory collapse and serum sodium rather slowly returned to normal levels.

Blood estimations showed a low serum sodium level which rose rapidly when salt was added to the diet. A balance experiment on a typical patient showed abnormal loss of sodium, and to a less extent of chloride in the faeces; in the urine sodium was rigidly conserved while chloride was excreted in less than normal amounts.

The clinical and laboratory findings suggested that dehydration was due to salt deficiency. The comparative frequency of this as a complication of tropical sprue does not seem to have been appreciated for when the patient is put on a high intake of salt, sodium and chloride were both retained and the serum chloride and serum sodium rose to normal levels. The blood pressure rose and clinical signs of dehydration disappeared though the abnormal loss of fat in the stools was not affected.

Loss of electrolyte in copious watery stools is considered to be the main cause of the salt deficiency though diminished intake of salt in anorexic patients may also be a factor.

The results do not suggest that adrenal insufficiency can be considered as the serum potassium was not increased. Treatment by increasing the salt intake to 15 gm a day corrects the dehydration in a few days. *P. Manson-Bahr*

VENOMS AND ANTIVENENES

KHAN, I. Snake-Bite. *J. Indian Med. Ass.* 1946 June & July, v 15 Nos 9 & 10 303-7, 343-8.

The mechanism of biting and injection of venom and its action are then spoken of (even to mentioning tips or mnemonics for diagnosis and symptoms) and treatment by antivenenes, with a copy of the instruction sent out by the Director General of the Kasauli Research Institute. Need is stressed for early administration of the antivenene and the warning that it must be given only by a medical man. [No mention is made of the first aid treatment by carbolic soap emulsion to tide over the dangerous interval between infliction of the bite and the arrival of the doctor. See this *Bulletin* 1946 v 43 478.]

H. Harold Scott

MISCELLANEOUS DISEASES

DAVIES J N P An Accessory Liver in an African. [Memoranda] *Brit Med J* 1946, Nov 16 736-7

SOUBIGOU, X A propos de funiculite tropicale [Tropical Funiculitis.] *Bull Soc. Path Exot* 1946 v 39 Nos 7/8 287-9

BENHAMOU, E, NOUCHY & SEBAH P Noma et pénicilline [Penicillin in the Treatment of Cancrum Oris.] *Algerie Méd* 1946, May-June, No 3, 264-8.

Five cases are described One, a man of 32 years, in whom cancrum oris complicated an attack of measles The blood examination ruled out agranulocytosis All the usual treatments—mouth washes, silver nitrate, Vitascorbol, sulphonamides, etc—were tried in vain and he was given 100,000 units of penicillin daily, administered every 3 hours, for 12 days Improvement, though gradual, was steady and cure was obtained in 15 days

The second patient, a woman with typhoid fever [age not stated], 4 days after admission to hospital on the 20th day of her illness, developed noma, and two days later penicillin intravenously was started 20,000 units every 3 hours Improvement was observed "after the third injection (160 000 units)" [says the author, but 3 injections of 20,000 units would be only 60,000] She left hospital, cured, a month after her admission In three other cases of

H Harold Scott

TUPAS, A V & JONGCO, A P Cancrum Oris : Observations on its Incidence and Treatment. *J Philippine Med Ass* 1946, Apr, v 22, No 4, 153-7 [15 refs]

"1 Fifteen cases of cancrum oris admitted and treated in the Pediatrics Department of the Philippine General Hospital from April 4, 1945, to April 5, 1946, were presented

"2 The incidence of noma in the Philippines, before, during, and after the second world war was discussed

"3 A reduction of the mortality rate from 70-100 per cent to 6.67 per cent. with the use of sulfa drugs and penicillin was reported

"4 Other reports on the incidence, mortality, and treatment of cancrum oris were briefly reviewed and compared with our findings"

CEYLON HEALTH NEWS 1945, Oct Dec v 12, No 2, 11-12 Manioc Poisoning.

In the present food crisis, the cultivation and consumption of manioc is increasing and is likely to continue to increase, and cases of poisoning have already occurred in Ceylon

The present paper is intended to guide the population in the safe use of manioc and to aid doctors in investigating suspected poisoning cases thoroughly.

Manioc contains a cyanogenetic glucoside harmless in itself ; but when the root is bruised or damaged an enzyme is set free which breaks up the glucoside and liberates the hydrocyanic acid.

The glucoside is concentrated in the outer layers of the roots, and chemical analyses show that whilst the peel contains an average of 0.1 per cent of HCN, the rest of the root only contains 0.003 per cent, the purpose of the glucoside being to serve as a potential protection of the root from pests.

In the preparation of manioc, the following precautions are necessary :—

1. It should not be bruised or crushed and damaged roots should be discarded.
2. The roots should be fresh, and not be exposed to sunlight for long.
3. For cooking, the outer rind should be peeled off, the roots quickly washed, and the pot only half filled with the peeled roots.
4. The water level should be above the surface of the yam, so that steam does not condense on the exposed manioc.
5. The vessel should not be covered, so that any remaining poison may escape with the steam.
6. The water used for boiling the manioc should be thrown away.

In treating manioc poison, uncooked fresh plant materials, such as ginger, should be avoided, since their enzymes would liberate the HCN from the glucoside. A mixture containing ferrous and ferric salts with a little bicarbonate of soda should be given. Other adjuvants to treatment are (1) stomach wash-out ; (2) sodium thiosulphate solution intravenously ; (3) care of the general condition of the patient.

The investigation of a suspected case of manioc poisoning should take account of the history of the meal and the number of persons taking it, the source and condition of the manioc, especially whether it was fresh or bruised, the method of cooking ; whether the root was peeled, and the quantity of water used and its disposal.

H. J. O'D. Burke-Gaffney.

GREVAL, S. D. S. & BHADURI, P. N. Poisonous Foodgrain : Wheat mixed with *Lolium temulentum*. *Indian Med. Gaz.* 1946, Aug., v. 81, No. 8, 294-6, 4 figs. on 1 pl. [18 refs.]

In the period October 1942-November 1945, some 450 persons in Aden suffered from *loliismus*, the symptoms were typical and there were no fatal cases ; recovery of consciousness took place in 3-10 hours and all were able to return to work in 3 days. In Arabia, the weed is usually separated from the wheat before reaping-time, or, as in Abyssinia, the wheat is separated by sieving or by winnowing, but this was not done in Aden. The actual poisoning is now known to be due to a contaminating fungus between the seed-coat and the endosperm, living symbiotically in the grains—a type of smut fungus. The author describes the weed and its distribution, facts with which readers of this *Bulletin* are well acquainted. Two photographs show well the resemblances and differences between the grains of wheat and those of *Lolium temulentum*.

H. Harold Scott.

MANCEAUX, A. & SUSINI, R. Les crises nerveuses dans l'armée (étude portant sur 1,100 cas). [A Study of Nervous Disturbances in 1,100 Troops in Algeria.] *Algérie Méd.* 1946, July-Aug., No. 4, 331-4.

GENERAL PROTOZOOLOGY

SANTOS ZETINA F. El vital problema sanitario de la zona Henequenera [Sanitary Problems in the Henequenera District (of Yucatán).] *Rev Med Yucatán* 1946 Aug 31 v 23 No 12 523-6

During the year 1945 the following numbers of cases of infections and infestations have been recorded in the zone in question *Intestinal parasites* *E. histolytica* *Balantidium coli* *L. intestinalis* *A. lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis* and hookworm 72 072 The percentages are given of 10 920 at one hospital these were *Trichuris* 63 17 *Ascaris* 40 9 *Trichomonas* 28 6 *Lambia intestinalis* 24 1 *Entamoeba histolytica* 15 3 *Taenia* sp 3 31 *Tetramitus mesnili* 1 2 *Necator americanus* 0 8 It is conclusively affirmed that 90 per cent of the children in Yucatan harbour parasites

During the year 15 391 cases of malaria were recorded [but no details as regards type] cases of syphilis numbered 5 739 of tuberculosis 3 206 and of enteric fevers 1 577 [The population of the district is not mentioned so the actual degree of prevalence cannot be estimated and the figures in consequence are not very informative] H Harold Scott

WATSON J M. The Bionomics of Coprophilic Protozoa *Biol Reviews* 1946 July v 21 No 3 121-39 [Numerous refs.]

GENERAL ENTOMOLOGY

WILLIAMS K. Man's Reaction to Mosquito Bites (Correspondence) *Nature* 1946 Oct 19 554

People react differently to insect bites and repeated exposure may alter a given person's reactions. In order to pursue these factors further studies were made on human volunteers who had never travelled outside Britain and who were exposed experimentally at different periods to the bites of *Aedes aegypti* and *Anopheles maculipennis atroparvus*.

Twenty-five volunteers all gave a similar reaction. At first there was no immediate reaction following a bite, but after a few minutes a small red swelling appeared. A marked delayed reaction occurred about 24 hours after the bite, in the form of a red patch with a definite weal in the centre.

period of a month the resultant reaction developed now taking

the same persons repeatedly exposed at the immediate reaction

aegypti bites as observed

				Immediate Reaction	Delayed Reaction
Stage I		—	+
" II		+	+
" III		+	—
" IV		—	—

It is suggested that the reactions are distinct and are caused by different antigens in the mosquito's saliva.

Similar, though not identical, results were obtained with *A. maculipennis atroparvus*. The phenomena of sensitization and immunity in the reactions appear to be specific: for example, one person may give a stage I reaction to *Anopheles* and a stage II reaction to *Aedes* simultaneously.

Investigations, still being pursued, appear to indicate that other species of biting insects fit into the scheme, with modifications: and that most people react similarly to the same degree of exposure, though in some cases hypersensitivity and severe allergy occur.

H. J. O'D. Burke-Gaffney.

HOLLENBECK, A. H. A Practical Method for Mass Production and Transfer of *Xenopsylla cheopis*. *J. Parasitology*. 1946, Oct., v. 32, No. 5, 463-4, 1 fig.

NAJERA, L. The Ecology of Sandflies at the Larval Stage and the Epidemiology of the Diseases transmitted by them. *Bull. Health Organisation*. (League of Nations.) 1945/46, v. 12, No. 3, 394-406, 6 figs & 1 plan [29 refs.]

This contains much the same information as the paper by the same author, abstracted in this *Bulletin*, 1946, v. 43, 832

COUDERT, J. & BAUD, C. Procédé de montage des échantillons parasitologiques dans les verres synthétiques. [Mounting Parasitological Specimens in Transparent Plastics.] *Ann. Parasit. Humaine et Comparée* 1946, v. 21, Nos. 3/4, 177-82, 3 figs.

The authors wish to preserve teaching material, such as whole insects, in such a way that students can examine and handle it but without breaking the specimen. They do this by embedding in a block of a transparent plastic.

The authors prefer to use methyl methacrylate, but have worked with vinyl acetate and styrolene. Their general method is to distil a quantity of the monomere, and soak the dehydrated specimen in it. Some of the monomere is then polymerized by heat in the presence of a catalyst, and as it thickens is poured into a mould, the specimen being transferred to it at the same time. Polymerization is completed in a stove. When the moulded block is hard it is rubbed down and polished with abrasives.

Small dissections, and such soft animals as worms, can be embedded, dehydration being very slow to avoid shrinkage.

P. A. Buxton.

GARNHAM, P. C. C. The Efficacy of Insecticidal Sprays in Aircraft. *East African Med. J.* 1946, Sept., v. 23, No. 9, 272-7.

Routine disinfection of aircraft is now carried out practically everywhere in the tropics. The method used at Kisumu in East Africa involves the use of aerograph pressure sprays with pyrethrum preparation content, the quantity of solution sprayed in the closed aircraft is at the rate of approximately 40 ccs. per 1,000 cu. ft., and time of exposure ten minutes. [The pyrethrin content of the preparation is not quoted; Shelltox and Deskito were among those used and presumably approximated 2 per cent. pyrethrin content after dilution.]

[February, 1947]

Tropical Diseases Bulletin

Routine testing of the efficacy of this treatment is effected by the results of exposure to the spray of three female *Aedes aegypti* and three *Taeniorhynchus uniformis* contained in a mosquito cage a three inch cube in size. Three such cages are used and placed at strategic positions within the aircraft. An effective spraying should result in the stunning of all mosquitoes in five minutes and no survivals after fifteen hours the cages having been removed in a Barraud's box after ten minutes exposure.

The efficacy of such disinfection in inaccessible places within the aircraft was also investigated and the conclusion was that a higher dosage namely 1000 cu ft was necessary to ensure killing all mosquitoes hidden in remote corners.

Experiments conducted to determine the degree of protection to mosquitoes by coats, wraps etc accompanying the passengers in the aircraft showed that even a thin covering is apparently sufficient to protect caged mosquitoes from heavy doses of powerful insecticide. This observation led to further experiments in the laboratory in which mosquitoes were placed inside the sleeves of raincoats and the raincoats exposed to various dosages of insecticide. Using the freon bomb dosages of seventeen seconds per 1000 cu ft were ineffective four times this concentration would be four to six seconds per usual doses of this insecticide in an aircraft. The observation on the part of mosquitoes 1000 cu ft there did not appear to be any tendency on the part of mosquitoes to leave the sleeve because of irritation by the mere presence of the insecticides.

The author concludes that all parts of the aircraft are accessible to insecticides if used in sufficient concentration with the provision that particular care must be taken in regard to the possibility of mosquitoes being protected by clothing. He recommends spraying of the aircraft while in flight or just before departure the latter being less satisfactory.

[In practice effective results must necessarily depend on the efficiency of the staff the whole process being subject to inspection by the local health authority.]

R Ford Trede

STEWART J S Application of "Gammaxane" to Arthropods of Veterinary Importance Nature 1946 No 2 636-7

GUAYANE FRANÇAISE RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR DE LA GUAYANE FRANÇAISE ET DU TERRITOIRE DE L'INDEPENDANT L'ANNÉE 1945 [FLOCH H Director] (Publication No 125 1946 Cayenne) pp 114-33 [12 refs] Entomologie [Entomology], pp 133-4 Acariens [Acaridae]

These notes though published under the name of the Institute are presumably contributed by the entomologist E Abonnenc. They cover a wide range of subjects mosquitoes *Phlebotomus Simulium* urticating moths and Ixodid ticks. The information is difficult to summarize much of it is published probably more fully in the Institute's publications more than twenty of these published separately were issued in 1945.

P 4 Buxton

GUAYANE FRANÇAISE RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR DE LA GUAYANE FRANÇAISE ET DU TERRITOIRE DE L'INDEPENDANT L'ANNÉE 1945 [FLOCH H Director] (Publication No 125 1946 Cayenne) pp 102-12 [11 refs] Insecticides végétaux en Guyane [Vegetable Insecticides in Guiana]

The infusions of various plants growing in French Guiana were tested for toxicity to larvae of Anopheline and Culicine mosquitoes to the larvivorous

fish, *Pocillia vivipara*, and to several fresh water snails (elsewhere carriers of bilharzia). Of the plants tested, the fruits of *Sapindus saponaria* Aublet, leaves and shoots of *Bauhinia aspera* Aublet and seeds of the avocado pear, *Persea gratissima* Gaertner had some insecticidal action, but definitely less than that of derris containing 5 per cent. rotenone. These plants were used as fish poisons and were toxic to *Pocillia*. The seeds of the fruits of *Mammea americana* L. (Gutiferae) seemed more likely to have practical value, for they gave an extract nearly as toxic as the derris and less poisonous to fish. The seeds of *Sapindus saponaria* had a definite toxic action on fresh-water snails probably because of their high saponin content.

DDT powder was more toxic than rotenone to mosquito larvae though it was somewhat slower in action; it had little or no effect on the mollusca.

J. R. Buxvine.

LABORATORY PROCEDURES.

KAUMP, D. H. Laboratory Tests in General Practice. *J. Amer. Med. Ass.* 1946, Oct. 5, v. 132, No. 5, 253-8 [Refs in footnotes.]

SINGER, R. A Note on Leishman Staining. [Correspondence.] *Clin. Proc.* Cape Town. 1946, June, v. 5, No. 4, 183-4.

The author was unable to obtain acetone-free methyl alcohol during the War and he therefore used ordinary absolute alcohol in a modification of the self-buffering solution described by WITLIN [this *Bulletin*, 1945, v. 42, 232]. The cost of the absolute alcohol was considerably less than that of methyl alcohol of the kind required.

The solution was prepared by dissolving 120 mgm. of sodium acetate in 100 cc. of absolute alcohol, and adding to this solution 0.4 cc. of a solution of 0.1 cc. glacial acetic acid in 100 cc. absolute alcohol. This is the same prescription as that of Witlin except that (a) absolute alcohol replaces methyl alcohol throughout, (b) Witlin used a 1.0 per cent. solution of glacial acetic acid.

[The author states that, in his modification, "the total amount of acetic acid in 100 cc. of sodium acetate-acetic acid absolute-alcohol-solution is 0.004 cc." If 0.1 per cent. glacial acetic acid was used originally, this total should read 0.0004 cc. Witlin, in his original paper, used 0.1 cc. of glacial acetic acid in ten, not one hundred, cc. of methyl alcohol, i.e. a 1 per cent. solution, and stated, correctly, that the total amount of acetic acid in 100 cc. of the final buffer solution was 0.004 cc.]

The Leishman's stain was prepared by adding 0.16 gm. of Leishman's powder to 100 cc. of the buffer solution. The latter kept the pH of the staining solution at approximately 6.4-6.6. The author makes the warning that tap water should not be brought into contact with the apparatus used.

For staining blood smears, the staining solution is added drop by drop until it covers the whole smear, and is then allowed to stand for 4½ minutes. Distilled water is then added in drops until the layer of mixed fluids covers the whole slide. Mixture is effected by gentle tilting. The staining mixture is allowed to stand for 4 minutes and the preparation is then washed with distilled water and dried.

Clear colour differentiation is obtained and the author claims that by using the technique described normochromic may be distinguished microscopically at once from hypochromic bloods, since in the former the red cells appear red or bright pink, while in the latter they stain grey.

Only one malaria smear could be obtained and the parasites stained very satisfactorily For staining blood smears for parasites the following technique was adopted —

- 1 Stain with Leishman stain for half a minute
- 2 Add half the amount of distilled water mix leave for 10 minutes
- 3 Wash in running water for 3 to 5 minutes Dry

The author obtained successful results with the solution in airtight flasks after 9 weeks
H J O D Burke Gaffney

PESIGAN T P & GARCIA E Y A Modified Field Stain for Rapid Staining of Thick and Thin Blood Smears *J Philippine Med Ass* 1946 Apr v 22 No 4 165-71 [12 refs]

qu sta

mental trials with materials then available They aimed at obtaining a product which would be economical (particularly in methyl alcohol) and which would simplify and shorten the staining process without sacrificing clarity in the preparation

They eventually chose a method involving three separate solutions namely —

- I Methyl alcohol—Absolute or 95 per cent for fixation (Old thin smears and thick blood films do not need fixation so methyl alcohol can be dispensed with but this cannot be done with fresh thin smears)
- II Basic stain
 - Brilliant cresyl blue 0 35 gm
 - Azure II 0 50 gm
 - Borax solution 2 5 per cent 100 00 cc
- III Acid counter stain
 - Eosine Y (Water soluble) 0 20 gm
 - Distilled water 100 00 cc

Very full details of preparation and staining technique are given The principles and history of stains for blood examination are also discussed at length

The stain described is a modification of a number of familiar ones notably those of Manson of MacNeal and of Field

The authors claim that young red blood cells are recognizable with this stain and they have found it useful for splenic marrow and brain smears also Precipitates rarely appear and the stain is economical as the solutions may be used several times if kept in Coplin jars
H J O D Burke Gaffney

MATHER K The Genetical Requirements of Bio-Assays with Higher Organisms
Analyst 1946 Sept v 71 No 846 407 11

Living organisms such as laboratory animals and plants which are used to measure chemical substances and to test their action should differ individually as little as possible so that the results of experiments may be as nearly uniform as possible Variations among individuals of a species may be produced both by environment which affects chiefly the outward characters (phenotype) and by inheritance by which the actual genetic constitution (genotype) is changed The environment (e.g feeding housing) can be standardized to a considerable extent but to increase similarity by inbreeding a knowledge of genetics is required

There could be little doubt and it has in fact been shown that heritable variation exists between individuals in their reactions to substances for which

they are used as test organisms. Variations due to differences between one or a few genes with large effects (as for example Mendel's tall and short peas) are important in bio-assay; a variant of a fungus due to mutation of such a gene was unable to synthesize a substance necessary to its full development and the variant could therefore be used to assay that substance in the medium in which it was grown [see PONTECORVO, below]. Such mutations have been produced by radiation and were heritable like natural mutations; more commonly, however, a heritable variation is due to the simultaneous action of a number of genes producing similar effects—quantitative or "polygenic" variation.

Asexual reproduction of identical twins) pro of mutation would by off dev
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suitability for assay work, the latter can be overcome by using the first cross between two lines, as the heterogeneous offspring are as uniform genetically as their parents, and are more vigorous (see PHILIP *et al.*, *Nature*, 1944, Aug. 26, 260).

There is need for more knowledge of the inheritance of variation in the responses upon which assays are based, of behaviour under inbreeding, and of the comparison between F_1 's and their inbred parents: the geneticist and the assayist should exchange information for their mutual benefit. The use of animals with ease might help to speed at the same time

paper may remind the research worker on tropical diseases abroad of the need for as much uniformity as possible in the living organisms and in experiments, and in their environment.] [The reader may also wish to refer to CORSON's paper in this *Bulletin*, 1946, v. 43, 169.—Ed.] J. F. Corson.

PONTECORVO, G. The Genetical Aspects of Bio-Assays with Micro-Organisms. *Analyst*. 1946, Sept., v. 71, No. 846, 411-13.

Although bacteria and most moulds multiply asexually they are not study as they undergo heritable mutation the growth response of the microorganism, should have maximum specificity (ideally response to one substance only) and minimum variability.

A pure line of a mould or a yeast can be grown from an ascospore, which has only a single set of genes; the cells, however, are subject to mutation and the consequent heterogeneity is not overcome by repeated single-sporing.

Genetic investigation of bacteria is new but promises to yield valuable results; among recent work is that of DEMEREC (*Ann. Mo. Bot. Gard.*, 1945, v. 32, 131) who found that resistant individuals arose repeatedly in a sensitive strain of *Staphylococcus aureus* exposed to penicillin; resistance was not caused by penicillin but resulted from selection [but see abstract of DEMEREC's similar paper, *Bulletin of Hygiene*, 1945, v. 20, 574]. No means of restricting the development of such resistant forms is at present known.

Most genes act by controlling specific steps in metabolic processes, e.g. in the synthesis of arginine by the mould *Neurospora* two genes control the step

from ornithine to citrulline and one gene the step from citrulline to arginine many other examples are known. A gene can be inactivated by irradiation and the corresponding step blocked. The mutation is heritable so a strain can be produced which is unable to perform the metabolic process and can therefore be used for an assay of the nutritional requirement for growth in the culture medium (BEADLE *Chem Rev* 1945 v 37 15).

Mutant strains of other fungi and bacteria affecting many processes such as syntheses of amino-acids and water soluble vitamins have been obtained. Artificially produced mutants have advantages over those occurring naturally. Requirements can be induced for new substances which no known natural strain requires. The same organism can be used to produce several mutants each requiring a different nutrient and blocks can be produced at the most suitable positions. Once a perfect strain is produced it can be used indefinitely as reverse mutation is unlikely to occur. The genetic technique is simple and collaboration between geneticist and assayist would benefit both.

J F Corson

MONROE L & HOPPER J Jr. A Simple Method of determining the Specific Gravity of Small Samples of Urine. *J Lab & Clin Med* 1946 Aug v 31 No 8 934 5

The method described by the author is a combination of two existing techniques those of Barbour and Hamilton and of Phillips and associates. Drops of urine are observed in insoluble media of known specific gravities and there is no need for a watch or for adjusting the mixtures during the test. The method can be applied to measuring the specific gravity of any watery solution.

A series of specific gravities covering the range desired are prepared in 100 cc lots by mixing xylene and bromobenzene (XBB) [Eastman Kodak Xylene T275 Bromobenzene No 43] in the proper proportions [see table].

The urine to be tested is introduced under the surface of successive solutions in the graduated series by means of a dropper. The specific gravity of the urine lies between that of the mixture in which the drop rises and that in which it falls. If the drop neither rises nor falls in the bottle the specific gravities of the urine and the mixture are the same.

The xylene bromobenzene solutions may be made volumetrically (for which table is given in the text and reproduced below) or roughly by trial with a meter.

Specific Gravity	Xylene (cc)	Bromobenzene (cc)
1.005	78.18	21.82
1.010	77.38	22.62
1.015	76.58	23.42
1.020	75.78	24.22
1.025	74.98	25.02
1.029	74.34	25.66

Thus a 0.16 cc increase in the quantity of bromobenzene and an equal decrease in the amount of xylene will increase the specific gravity .001.

For clinical purposes mixtures in the range 1.005 to 1.029 are usually sufficient. For more accurate work corrections for evaporation and temperature are described.

If the mixtures become cloudy on repeated use, they may be cleared by filtration through an average-grade filter paper.

The authors point out a number of specialized applications of this method, apart from its value in dispensing with the need for a urinometer. It is a sensitive complementary test to the relatively crude phenolsulphonphthalein test in comparing the kidneys separately, when only a few drops of urine are available after ureteral catheterization: it is useful in the examination of infants, where urine specimens may be scanty, and it is applicable to studies of renal function in small animals

H. J. O'D. Burke-Gaffney.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

ROCKEFELLER FOUNDATION. INTERNATIONAL HEALTH DIVISION. Annual Report, 1945. pp. ix + 147, 14 figs. on 7 pls. New York 49 West 49th Street.

The work of the International Health Division of the Rockefeller Foundation, with its staff of some 80 trained investigators dealing with health problems in collaboration with Governments and public institutions throughout the world, is too well known and well appreciated to require either introduction or description.

The Annual Report for 1945 once more presents a striking record of vast undertakings launched under the continued vicissitudes of war, for since 1940 the European field had been closed to the Division. During the year the Latin American programme therefore increased proportionately, and indeed its designation for 1945 exceeded those of all other regions combined.

Nevertheless the work adapted to war conditions was continued into the coming of peace, and the Division was ready and equipped to meet the transformation. Researches into typhus fever in the Mediterranean and European theatres were continued in collaboration with U.S. Typhus Commission in the Cairo Laboratories. after the end of hostilities in Europe, a team from the Oxford Nutrition Survey visited the Netherlands and Germany where they studied the pressing problems of deficiency diseases. assistance was also given to the All-India Institute of Hygiene in conducting Dietary Surveys.

The general investigational work of the Division was centred as in previous years, on some 12 diseases, with the major emphasis on yellow fever, malaria and influenza.

Between 1942 and 1945 (in which years the Division's Vaccine Laboratory ceased to manufacture its serum-free yellow fever vaccine) nearly 24 million doses were released. The Rockefeller Foundation Health Commission advised and assisted financially in the establishment of the yellow fever vaccine laboratory in the South African Institute for Medical Research in Johannesburg, where the vaccine for use in Africa is now manufactured. Much useful research on yellow fever was done and has been noted in this *Bulletin* one particularly important piece of work was the study of the epidemiology of yellow fever in Bwamba County in Uganda. Research was also conducted in Nigeria and in South America.

Work on malaria was carried out in many centres, and dealt, amongst other subjects, with chemotherapy, the exoerythrocytic phase of the parasites, the life-cycle of *P. gallinaceum* and *P. lophurae*, and a great deal of field work concerned to a large extent with the use of the newer insecticides.

from ornithine to citrulline and one gene the step from citrulline to arginine. Many other examples are known. A gene can be inactivated by irradiation and the corresponding step blocked. The mutation is heritable so a strain can be produced which is unable to perform the metabolic process and therefore be used for an assay of the nutritional requirement for growth in culture medium (BEADLE *Clem Rec* 1945 v 37 15).

Mutant strains of other fungi and bacteria affecting many processes such as syntheses of amino-acids and water-soluble vitamins have been obtained. Artificially produced mutants have advantages over those occurring naturally. Requirements can be induced for new substances which no known natural strain requires. The same organism can be used to produce several mutants each requiring a different nutrient and blocks can be produced at the most suitable positions. Once a perfect strain is produced it can be used indefinitely as reverse mutation is unlikely to occur. The genetic technique is simple and collaboration between geneticist and assayist would benefit both.

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H. J. O'D. Burke-Gaffney.

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The widespread infections with influenza B virus in the U S stimi further work on this and on A virus principally in connexion with immun and the production and use of a suitable vaccine

res

Widespread nutrition studies were carried out

The statement of services rendered to Governments and local Health Se

Report ends with a complete list of expenditure on Public Health work 1913 to 1945

suffering

H J O D Burke Gaffn

TROPICAL MEDICINE NEWS Bethesda Md 1946 June 13 No 3
Incidence of Insect-borne Diseases in U S Army during World War II

The following provisional figures of insect borne diseases in the U S during the recent war are given by Lt Col McCoy Chief of the Tropical Diseases Control Branch Surgeon General's Office U S Army —

Disease	Cases	Rate per 1 per year
Malaria	440 789	20 0
Dengue	82 392	3 7
Sandfly fever	12 223	0 5
Typhus fever (total)	7 269	0 3
Scrub typhus	6 803 (estimated)	—
Endemic typhus in U S	402	—
Epidemic typhus	61 (estimated)	—
Filariasis (<i>Wuchereria</i>)	2 110	0 09
Leishmaniasis	344	0 02
Relapsing fever	241	0 01
Rocky Mountain spotted fever	60	0 002

It is noteworthy that no antrax, plague, yellow fever, any of the trypanosomiasis was recorded (although two cases of *T. cruzi* infection known to have occurred in soldiers in Panama)

The malaria figures include readmissions to hospital but do not include statistics from the Philippine Islands prior to October 1944 as records lacking

The filariasis infections (*W. bancrofti*) were acquired almost entirely on certain S Pacific islands in the early days of the war

The figures for leishmaniasis are preliminary

H J O D Burke Gaffn

BIGGAM, A. Wartime Advances in Medicine which might be translated into Civil Practice. *Edinburgh Med. J.* 1946, Aug., v. 53, No. 8, 413-28.

This article is a brief summary of the important advances made in the field of [tropical] medicine during the war years: further condensation can only be achieved by enumeration.

Against insect transmitters of disease, the now world-famous insecticide, DDT (dichlor-diphenyl-trichlorethane) came into general use and the more potent benzene hexachloride (666) was discovered. The general insect repellent, dimethyl-phthalate (DMT), and the miticides, dibutyl-phthalate (DBT) and benzyl benzoate—the latter being particularly useful in scabies—were introduced.

For malaria control, in addition to DDT—which was used extensively against both the adults and larvae of anophelines—and the repellents mentioned above, mepacrine (atebrin) was put on a sound basis as a suppressive as well as a curative drug: a daily dose of 0.1 gramme will suppress benign tertian malaria as long as it is being taken and if maintained for one month after the subject leaves an endemic area, it will "cure" subtertian malaria. For the complete cure of benign tertian malaria, pamaquin (plasmoquine) 0.03 gramme plus quinine grains xxx daily for ten days has been shown to be the most effective combination. [This last observation must surely be classed as one of the war's rediscoveries—*vide* this *Bulletin*, 1929, v. 26, 14.]

Paludrine, which did not appear until the end of the war and did not come into general use is, apparently, a true causal prophylactic as far as malignant tertian malaria is concerned, and in doses of 100 mgm. daily acts as a more efficient suppressive of benign tertian than does mepacrine.

New drugs have altered the whole outlook in bacillary dysentery. The British favoured the relatively insoluble sulphaguanidine (5 gm. every three hours for the first 24 hours), the Americans the more soluble sulphadiazine. More recently two other drugs have been introduced and may replace each of the former when they have had a longer trial: these are phthalyl-sulphathiazole and sulphamezathine, the latter having the advantages of high solubility without the disadvantages of liability to cause kidney damage. The practice of administering these drugs immediately on the first appearance of diarrhoea cut down the incidence of bacillary dysentery in the Army to a remarkable degree. Bacteriophage therapy was decently buried.

No quick cure for amoebic dysentery was found. A notable advance was made by the use of penicillin and the sulphonamides in conjunction with the amoebicidal drugs in the treatment of the chronic condition; doses of 30,000 units every three hours up to two million units of penicillin, and of 10 to 20 grammes daily of one of the sulphonamides, are given. The routine course for chronic amoebiasis includes penicillin and phthalyl-sulphathiazole for 8 days, chiniofonum (yatren) enemata for 12 days (or diodoquin by mouth for 20 days), and carbarsone or stovarsol for 12 days, followed by a period of observation for 4 months with repeated stool examinations.

... buted to DDT and-vaccin-
ati : was brought about by the
ex : e vaccine for this infection
arrived too late for a satisfactory field trial.

The sulphonamides, whose value in cerebrospinal fever is well recognized, proved useful for the elimination of carriers. Doses of 3 grammes a day for three days of sulphadiazine or sulphathiazole were adequate.

Penicillin is of doubtful value in Weil's disease, but successful in both forms of rat-bite fever. In the rapid form of treatment of syphilis, 2-4 million units

of penicillin given in 7½ days will cure primary Wassermann negative cases but the relapse rate with primary Wassermann positive cases is too high for safety.

For sea sickness 1/100 gr hyoscine one hour before embarking repeated in 6 hours time was found the most successful.

Among advances in laboratory diagnostic methods the demonstration of elementary bodies in smallpox vesicles and the rickettsia differential agglutination in typhus fevers are mentioned.

Other subjects discussed include psychiatry physical development centres military convalescent depots and administration in all of which the author considers that from Army experience we have learned much that can be applied in civil life.

L. E. Napier

WHITE J. G. Administrative and Clinical Problems in Australian and British Prisoner-of-War Camps in Singapore, 1912 to 1945 *Med J Australia* 1946 Sept 21 v 2 No 12 401-3

FIDLEY H. H. Prisoner-of-War Camps in Borneo *Med J Australia* 1946 Sept 21 v 2 No 12 403-4

O'BRIEN H. R. Health Conditions in certain Large Cities of the Far East after Liberation *Pub Health Rep Wash* 1946 Sept 13 v 61 No 37 1339-50 4 figs

The author was Chief Medical Officer of the Philippine Mission and of UNRRA in the Far East and made observations on the prevalent diseases of seven of

water supply housing difficulties and food shortage. In Rangoon smallpox accounted for some 8 cases weekly (probably there were others which were not notified) from May 1945 with a 50 per cent fatality. Plague cholera chickenpox and mumps were present but only a few cases of each. Bangkok had a serious smallpox epidemic with a high fatality of 50 per cent and cholera was rife (144 deaths in May 1945). In Saigon malaria dysentery and beriberi were serious. The Pasteur Institute continued to prepare vaccines against smallpox cholera plague rabies typhoid dysentery and influenza. In Manila deaths from starvation were many and the chief diseases causing death were pulmonary tuberculosis beriberi dysentery and pneumonia. In Singapore the main mortal diseases were as was expected malaria dysentery tuberculosis and beriberi. The last between September 2nd and October 6th 1945 caused 16.2 per cent of all deaths. To avert epidemics some 100 000 persons were vaccinated against smallpox and enteric fever from September to December inclusive. A small poliomyelitis outbreak developed in February 1946 [nothing

.. ..

owing it is thought to the immunization efforts of the Japanese there were no deaths from this cause till January 1946. In Batavia overcrowding and bad hygiene resulted in or were followed by typhoid dysentery and a measles outbreak. In Hong Kong the usual overcrowding was intensified by the influx of 750 000 refugees increasing the total population by 75 per cent. Malaria was rife and tuberculosis was one of the chief causes of death accounting for 10.4 per cent of all deaths in the six weeks February 14th March 23rd 1946. Typhoid diphtheria cerebrospinal fever and cholera were also present but only in small numbers.

H. Harold Scott

DERHAM, A. P. Singapore and After : a Brief Historical Survey of the Activities of the Australian Army Medical Corps in Malaya. *Med. J. Australia.* 1946, Sept 21, v. 2, No. 12. 397-401, 1 map.

JANNONE, G., FERRO-LUZZI, G. & MARA, L. Risultati di una spedizione tecnico-Scientifica nella Danakalia Settentrionale Esterna. (Studio agrario, entomologico, malarilogico e di fisiologia alimentare. [Results of a Technico-Scientific Expedition in the Outer Northern Danakhil Country : Agricultural, Entomological, Malariological and Nutritional Studies.] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1946, Monograph No. 2, 167 pp., 23 figs. & 2 folding maps. [63 refs.] English summaries.

The authors, accompanied by Major K. J. Grant, R.A.M.C., made a tour lasting a month through the Danakhil Desert, and their report gives the results of their explorations. Very little has hitherto been published about this tract of country, a fact that endows this report with added interest.

The Danakhil country lies along the western shore of the Red Sea from 12°22' to 15°30' N. latitude. It comprises some 25,000 square kilometres, inhabited by rather less than 20,000 people. It is a barren, inhospitable country, partly mountainous, partly flat, and completely isolated from European civilization. Unfavourable climatic conditions, sterility of the soil, lack of roads, scarcity of water, no agricultural possibilities, and lack of trade with the outside world account for the isolation of its people. The activity of the people is mainly pastoral—goats, sheep, a few herds of cattle and some camels, donkeys and mules. Except for dwellers on the coast the pastoral community is nomadic, a nomadism compelled by the need of food and so controlled by the rainy seasons. Members of one tribe rarely if ever enter other tribal areas.

Climatic and ecological conditions generally are unfavourable to mosquitoes. Malaria is restricted to two small areas, the remainder of the country being almost entirely free from the disease. In the extreme north, conditions resemble those in other parts of Eritrea where *A. gambiae* is responsible for the spread of malaria. The second malarious locality is in and around Assab, where the vector is *A. culicifacies* var. *adenensis*. Other anophelines that were found in the Danakhil country were *A. d'thali*, *A. danalicus*, *A. rupiculus*, *A. funestus*, *A. rivulorum* and *A. turkhudi*, none of them is of local importance as a malaria vector.

Four species of *Aedes* were identified, *aegypti*, *caballus*, *arabiensis* and an unusually pale form of *villatus*. *Aedes aegypti* was confined to coastal towns.

Shepherds in the mountainous areas subsist on a diet composed exclusively of raw goats' milk. No gross evidence of malnutrition was seen among people on this milk diet. In the lowlands the milk diet is supplemented with a small amount of meat and "dura" (*Andropogon sorghum*) when milk is scarce. In the coastal areas, where social conditions are extremely poor and there is no pasturage, the diet is mixed but deficient. It consists of variable amounts of milk, meat, fish, cereals and the fruit of the "Dum" palm. Gross evidence of malnutrition is more common on the coast than elsewhere.

Norman White.

"The need for a constant adjustment between population and the resources available should receive serious consideration"

The population of India has increased during each decade since 1872 but the average rate of increase during the first five of the ten year periods since that time was only about 4 per cent. Between 1921 and 1931 the rate was 10.6 per cent and between 1931 and 1941 it was 13.6 per cent. During these 20 years the population of India increased by 83 millions.

It is considered essential that plans for the future in public health and other matters, should take into account a forecast of the probable population, and regret is expressed that no tabulation was made of the age and sex composition of the population in the 1941 census.

The only important artificial check that has been imposed on growth of population in India is the prohibition of remarriage of Hindu widows. Kingsley Davis estimates that if this ceased to operate there would be a net gain in fertility of 14 per cent.

The situation is summed up in these words — it is our considered opinion that the growth of population in India will become an increasingly serious problem.

Various solutions are discussed. Relief by emigration is regarded as impracticable, increased production of food and other commodities 'will be only a temporary expedient because a limit to economic production will be reached sooner or later and uncontrolled growth of population must, as far as we can see outstrip the productive capacity of the country.' Improvement in the standard of living is regarded as tending to cause a fall in the birth rate "by

still

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European communities in India, among the 25 members only one dissented from the views on the population problem. This member a European medical

without reservation. This high degree of unanimity must reassure those who fear that a frank discussion of the population problem is likely to give offence to Indians.

The survey of the health situation in India is admirable, it goes to the root of the matter by showing the need for a bold policy of improvement in the

health organization while at the same time pointing out that a sound public health policy must be based on a satisfactory state of nutrition, which in turn depends not only on increased production of the necessities of life but also on the restriction of the inordinate growth of population.

The recommendations for development are equally admirable, up to a point but in view of the clear statement that the success of the Plan depends on the maintenance of a favourable balance between available resources and population the recommendations for securing this balance come as something of an anti-climax. The Committee could not have been expected to produce a ready-made plan for solving the terribly complicated population problem, but they might at least have sounded a loud note of warning that there is an urgent need for a thorough investigation into the problem, seeing that their own findings have shown that a solution must be found if disaster is to be averted.

The Committee have, in fact, produced excellent plans for a new public health edifice for India, and have pointed out that this will collapse unless a sound foundation is prepared; they have also stated the general principles on which this foundation should be constructed, but the impression conveyed by the recommendations is that the erection of the edifice should be undertaken forthwith in the hope that somehow a secure foundation may be provided.

The experiment carried out by the U.S.A. since 1900 in Porto Rico has demonstrated that modern medicine and sanitation, even when backed up by universal education and intensive economic development, have failed to create satisfactory conditions of life in a population whose birth rate has remained almost stationary at about 40 per mille, while the death rate has fallen to about 20 per mille. In the report dated 1940, of a committee appointed by the late President Roosevelt, it is stated that "unless the population problem is solved, all else is 'whistling in the wind.'"

There is no reason to expect that the results of a similar experiment in India or any other over-populated country would be better in the absence of purposive restriction of the natural rate of growth of population. *John W. D. Megaw.*

MACLEOD, J. M. H. [M.A., M.D., F.R.C.P.(Lond.), etc.] & MUENDE, I. [M.R.C.P.(Lond.), M.B., B.S., B.Sc.(Lond.)]. *Practical Handbook of the Pathology of the Skin. An Introduction to the Histology, Pathology and Treatment of the Skin with special reference to Techniques of Examination, and 125 black & white illustrations.* London: H. K. Lewis & Co. Ltd. [50s.]

This handbook was first published in 1902 by J. M. H. MacLeod, a second edition was issued in collaboration with I. Muende in 1940 and, despite the limitations set by hostilities on its distribution, this edition was exhausted within four years.

The present volume does not differ greatly from its immediate predecessor and is an excellent and extremely practical work which will be valued at home or abroad by those who are interested in the pathology of the skin. Not a small part of its merit is that it is essentially a book for the practical pathologist and the practising clinician; all the important points are covered, however more pretentious works, are carefully set down, so that the reader can have little excuse for faulty biopsy technique, or for errors in the all-important task of fixing, hardening, embedding, cutting and staining. This last matter—the proper staining of sections of skin—is an art which is not widely studied and in many laboratories it seems to be believed that a standard haematoxylin and eosin stain is all that is required; therefore it is encouraging to note that

of those students who do present themselves for training and should be of great help to nurses in Britain who are preparing to undertake nursing duties overseas

Mary G Blacklock

NICHOLLS Lucius (C M G M D B C B A (Cantab) etc) [Edited by] *Aids to Tropical Hygiene* 3rd Edition pp vi+217 6 pls 1946 London Ballière Tindall & Cox 7 & 8 Henrietta Street Covent Garden W C 2 [6s]

The general principles for the practice of Public Health are the same throughout the world. On this admirable text Dr Nicholls opens his Preface to the 3rd edition of a work which by extension of this too frequently ignored premise might itself with advantage have been entitled *Aids to Hygiene in the Tropics*.

It is inseparably in the nature of a work of this kind which serves to guide its reader to the larger text books rather than to dispense with them that it concentrates hence some degree of generality becomes almost inevitable. In common with work is not altogether free from statements

pages

of Dr Nicholls

drawings

informative for a reader not already familiar with this speciality. Through the authors have adopted the admirable practice of tabulating material where possible and useful tables are found in every section describing for example the differences between species of parasites the uses food constituents diets differential diagnoses. The book is clearly presented and the value of the illustrations by Mr T D Whitton which now takes its place of the general principles of O D Burke-Gaffney.

TOBBACK, L. [Docteur en Médecine Vétérinaire, attaché au Ministère des Colonies]. *L'Inspection des viandes au Congo Belge*. [Meat Inspection in the Belgian Congo.] 85 pp., 9 figs. 1946. Brussels: Imprimerie A. Beirnaerdt, 41, Rue des Coteaux. [15 Fr.]

An Ordinance published in the Belgian Congo in 1935 prescribed that where possible all inspection of fresh meat should be undertaken by veterinary officers, and failing that, by medical officers or others adequately qualified: but where such qualified persons were not available, District Commissioners could, in exceptional cases, appoint as meat inspectors anybody whom they were satisfied were fitted to undertake that function.

The purpose of this handbook is to provide in readable form all the information necessary to enable a meat inspector to undertake this work.

The book opens with a discussion on the purposes and scope of meat inspection, and passes to a description of the slaughter of domestic animals, the technique of inspection, the points to be observed in examining an animal, and various useful anatomical and physiological descriptions, illustrated in part with diagrams.

The various defects and diseases likely to be encountered are then described at length, together with the significance, from the point of view of edibility, of different pathological states.

There follow sections which will be of special interest to the worker in the Tropics, for they include descriptions of parasitic and mycotic diseases of domestic animals, with a special reference to tropical diseases. A short note on the sterilization of meat is included.

There are four useful Appendices to the book, consisting respectively of a list of anatomical points to be noted in meat inspection, a table showing anatomical differences in sex and species between the commoner slaughter-
 extracts from the Belgian
 the procedure in force in
 d for food.

. lish especially designed for
 meat inspectors in the Tropics, and this well planned and set-up volume should prove of very great value to those concerned who read French.

H. J. O'D. Burke-Gaffney.

LIVADAS, Gregory A. [M.D., M.P.H., Director of Athens School of Hygiene, etc.] & SPHANGOS, John C. [M.P.H., etc.]. *Malaria in Greece (1930-1940). Research—Control*. 1941. Vol. I. pp. viii+238, 86 figs. & numerous illustrations, maps & diagrams and 1940. Vol. II. pp. vi+299, 246 figs. & 18 maps. Athens: "Pyrsos" Press Ltd.

This book was published in Athens in 1941, both in Greek and in English, but copies have only recently been received in England. The introductory chapters give a succinct account of the geography, climate, administrative organization and public health administration of the Kingdom of Greece. The somewhat chequered history of public health activity is outlined. The establishment of the Athens Health Centre and School of Hygiene in 1929, with the collaboration of the Health Organization of the League of Nations and of the International Health Division of the Rockefeller Foundation, marked the beginning of a period of intensified public health activity. The Malaria Division of the School of Hygiene started under the technical direction of a member of the staff of the Rockefeller Foundation and the Foundation continued to collaborate throughout the period covered by this report.

In these two volumes are gathered together comprehensive accounts of the results of malariological research, malarial surveys and malaria control

measures carried out in many parts of Greece during 1930 to 1940. It is a proud record. Much of the work will be familiar to students of malaria literature from reports published by BALFOUR BARBER, RICE SHANNON and Greek malariologists prominent among whom are the authors of these volumes, the senior being the Director of the Division of Malariology and Tropical Diseases of the Athens School of Hygiene.

The biology and geographical distribution of Greek anophelines are well described. *A. maculipennis*, *A. superpictus*, *A. elutus*, *A. bifurcatus* and *A. algeriensis*, *A. hyrcanus*, *A. plumbeus* and *A. marteri* also occur but are not so widely distributed.

The procedure and technique adopted in carrying out very numerous antimalarial programmes are fully described and very numerous photographs, charts and maps add much to the interest of the narrative. Little or no use had been made of spray killing adult mosquitoes as an antimalaria measure up to 1940.

The work recorded in these volumes is a credit to all concerned.

Norman White

AIR MINISTRY Principles of Anatomy and Physiology for Physical Training
Instructors in the Royal Air Force. A.P. 3125. pp. vi+180. 158 figs. 1946.
London: H.M. Stationery Office. [7s. 6d.]

might be of equal value to those engaged in teaching Africans and others who undergo modified medical courses in which a short course in these subjects is required.

One or two short chapters, e.g. Fitness for Flying and The Instructor's Part in Rehabilitation, are of course too specialized for the purposes indicated above, but the greater part of the book is taken up with information which will be found valuable. The illustrations are admirably simple, clear and well presented.

H. J. O. D. Burke-Gaffney

GREAT BRITAIN SCIENTIFIC INSTRUMENT MANUFACTURERS ASSOCIATION OF GREAT BRITAIN LTD Handbook with Classified Index of Instruments
pp. 49+73. [Private and Confidential, not to be published.] 1946.
London: 123 Pall Mall S.W. 1.

This handbook should prove useful to Medical Storekeepers and others concerned in purchasing scientific instruments.

It contains an alphabetical list of products and the manufacturers' Code Numbers, together with a handy thumb index referring to the full addresses of the various firms concerned.

Each page of the index is devoted to details of a particular firm and its products.

H. J. O. D. Burke-Gaffney

TROPICAL DISEASES BULLETIN.

Vol. 44]

1947.

[No. 3.]

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

Not a little of the work on this subject published during the past year is the outcome of researches carried out and observations made during the late war, but held back for obvious reasons until it was safe to make them public. This explains why information dated two years, and even longer, ago has only recently been given to the world.

Epidemiology.

BRUMPT (p. 4) has written an interesting article on the long-debated question of anophelism without malaria and on the spontaneous regression of malaria, showing how changes in agricultural methods may account for some instances, but by no means for all, and how, in others, the local mosquito is not attracted by man. In the same article, the author demonstrates the well-known fact that in areas long free of infection malaria may break out again if fresh gamete carriers, prisoners of war for example, are brought in.

FAUST (p. 286) published an interesting paper giving an account of the introduction of malaria into America, first by European explorers and settlers, and then by slaves imported from Africa. Later, most of the settled part became malarious, but in the south were hyperendemic centres. As agriculture developed and quinine became cheaper these areas shrank. More recently, with the economic depression of 1931, prevalence increased and this stimulated efforts at control so that, since 1933, there has been an almost uninterrupted decline. The present fear is of the possible dangers arising from the return of infected soldiers, sailors and civilians from malarious regions abroad, for *A. quadrimaculatus* and *A. freeborni* can transmit both the Pacific and Mediterranean strains of *P. vivax*.

SMITH (p. 281) attempted to appraise the value of the splenic index as a measure of malaria endemicity in southern United States, in districts with low highly malarious districts. The 4.9 in non-malarious and 6.3 in is, therefore, made that negro children should not be included in spleen surveys in southern States where the endemicity is low. Among white children, the percentages of spleens palpable

on deep inspiration were 12.2 in malarious areas and 10.8 in non malarious areas but greater degrees of enlargement were found in 11.1 and 3.2 per cent respectively due to places, thus for 15 per cent in the absence of malaria.

A neglected aspect of malaria epidemicity—the socio economic conditions

food their homes are kept in better repair the screening is mended or renewed and they can afford to pay for medical attention and treatment in bad years the reverse holds true. It is thought that these conditions suffice to explain the cyclic exacerbations of malaria every 5-6 years characteristic of the disease in the southern United States. At the same time it must not be forgotten that the delta region in north west Mississippi is a flat plain with many swamps and collections of water in which *A. quadrimaculatus* breeds.

Coming nearer home BIRRELL (p. 999) reports a case of benign tertian records eight cases of benign tertian malaria acquired by British troops in Normandy. It is true that *A. maculipennis* occurs there but no indigenous cases of malaria have been recorded from the locality for a long time. Infection it is thought may have originated in German troops stationed in Normandy subsequently to their having served in Africa or else from others of our own troops who had previously served in malarious regions.

DOELEMAN (p. 875) has published his thesis for the degree of doctorate of medicine Leiden University on malaria in Middelburg between 1940 and 1945 and on parasite carriers. He covers the question of so-called Zeeland fevers which include typhus enteric fevers and dysentery as well as malaria. Other records of malaria in Europe include that of an outbreak in September 1943

nically mild and without a tendency to relapse gametocyte carriers were as is usual in places where malaria is disappearing. Most of those attacked were workers imported for the grape harvest. GUHL (p. 283) records an autochthonous case in Switzerland.

DUKIANINA (p. 999) investigated the conditions under which infected persons in the Archangel Province became carriers also the effect of treatment the causes of repeated carrying and the density of parasites in carriers as compared with that in persons with clinical symptoms. He found that as a rule the carriers were those who had received insufficient drug treatment. The number of parasites in the blood of carriers is considerably lower than in acute cases in nine tenths of the patients not more than one parasite per field of the microscope could be found.

saccharum and less important *A. superpictus* breeding in rice fields swamps and canals. For dealing with the situation four measures were adopted systematic anti relapse treatment by mepacrine 0.3 gm daily in a single dose.

treatment of the entire population with 0.3 gm. mepacrine+0.04 gm. pamaquine on two successive days, repeated after an interval of five days; early detection and treatment of all acute cases of malaria and parasite carriers; and, lastly, monthly examinations of the people in order to detect carriers and to observe indices. POLUMORDVINOV (p. 283) reports endemic malaria at the limit of human settlement, more than 9,000 feet above sea-level, in southern Tadzhikistan, also in Middle Asia; all three types are to be found.

MILOVZOROVA (p. 1003) shows, from an illustrative instance, that, owing to the movements of the population of the U.S.S.R. resulting from the war, there is a danger of malaria being introduced into non-endemic areas. Prompt anti-malaria measures must be taken in hand to deal with contingents brought from endemic areas.

In Las Palmas, Gran Canaria, among more than 18,000 mosquitoes captured there was no anopheline and any malaria met with there is due to infection contracted elsewhere. In other parts of the island outbreaks occur, and infection is about equal between *P. vivax* and *P. falciparum*. GARCIA SASTRE (p. 283) records an outbreak of 77 cases at the end of 1941; another of 113 in the last four months of 1942; 2,164 cases in 1943, involving eight administrative divisions; in 1944 cases were reported every month and in every week but one, with a total of 3,978 cases in 13 of the 21 *municipios*. September had most cases, 971, February and March least, 26 each. The probable vectors were *A. hispaniola* and *A. sergenti*. NAJERA (p. 284) affirms that these are the only anophelines found in the Canary Islands.

DAS GUPTA and SIDDOBS (p. 4) attribute the high incidence of malaria, 33.1 per cent., in Calcutta to the refugees flocking there at the time of the Bengal famine in 1943. In December that year the figure was 44 per cent., in November the following year 51.7 per cent., of which quartan malaria was responsible for just over 1 per cent., the rest being almost equally divided between benign and malignant tertian. The causes assigned for the prevalence are malnutrition and lack of drugs for treatment. In the North Kanara District, Bombay Presidency, malaria is, according to VISWANATHAN (p. 285)

types of mist were used—a pyrethrum spray from aerosol dispensers Freon bombs and DDT in a strength of 2.5–5 per cent. The Freon bombs were used chiefly indoors 4–12 seconds spraying per 1 000 cubic feet and they were particularly effective against *Aedes*. Out of doors the following methods were adopted: a man walked along bush tracks at the rate of a yard a second with

pressure sprayer with a nozzle of 0.08 inch aperture.

HUNTER (p. 293) analysed nearly 3 000 cases of fever in a hyperendemic malarial area on the Assam-Burma border. Malaria proved to be the cause in 76 per cent; another 3 per cent were diagnosed on clinical grounds only. As regards types of infection the percentages were: among British troops *P. vivax* 64, *P. falciparum* 30, mixed 6; among Indian troops 47, 43 and 9 per cent respectively. One per cent of quartan is given for each [which would bring the British total to 101 per cent]. The lower prevalence of *falciparum* infections among the British troops may have been due to their having taken suppressive mepacrine. If blood smears gave persistent negative findings

(p. 999). By means of different colours four areas are depicted: (1) In which the risk is continuous—the East Coast near the border of Mozambique; (2) In

parasite rates from 10 to 18; in Moheli the former was 50 to 80 and the latter 20 to 30. Anjouan is least affected with spleen rates from 20 to 55. The vectors are *A. gambiae* and *A. funestus*. *A. mauritanicus* is also found but is not a vector. In Grande Comore the chief breeding places are the tanks supplying the villages with water.

Turning next to West Africa American troops, most of them coloured (five coloured to one white) were in 1942 stationed in a malarious region of Liberia. The parasitic index of the indigenous infants was 80 to 90 per cent.

MOORE (p. 4)

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Mossi in French West Africa
after a severe outbreak there
r 12 years of age there was a

spleen rate of 31.15 per cent at a parasite rate of 53.67 per cent. *A. gambiae*

was the chief vector, but *A. funestus* and *A. nili* were also present and the main breeding-places were the *marigots*—rivers that lose themselves in the ground—which became dried up at some seasons, but flooded in the rains. Some of these provide water at all seasons.

ing observation on the association of the female anopheline *A. funestus* Gold Coast. He found that during moonless periods the flighting of *A. funestus* was partially inhibited and when the moon came out they entered in numbers four or five times as many as on a moonless night. Also, they were observed to rest on the wall of the hut before beginning their meal and this may explain how residual DDT on walls is able to protect the occupants of a room against being bitten, the insects being incapacitated during the preliminary short resting period. It is probable that *A. gambiae* acts and suffers in the same way, but enough information on this has not been obtained for arriving at a decision.

The same author (p. 904) has carried out some experiments in the West African bush from which he concludes that bush-clearing around dwelling-places is not a justifiable measure for reducing anopheline infestation, at least in so far as *A. funestus* and *A. gambiae* in West Africa are concerned.

MELVILLE and his colleagues (p. 92) have recorded the results of surveys in several localities in Abyssinia, mainly in the Rift Valley region. North-west of the valley they found practically free from malaria, because the temperature is too low. There are highly endemic areas near Lake Chercher and also in the Dawa Parma and Ganale Doria river valleys, but the area which includes Mega, Moyale, Adola and Ghimir has generally a low endemicity. More than a dozen species of Anopheles are present, but the chief vector is *A. gambiae*. *A. pharoensis* and *A. d'halis* are possible vectors.

HENDERSON (p. 287) has written an article containing a general survey of malaria conditions prevailing in the Guianas and the Antilles and points out that there is a good opportunity and field there for research into several unsolved problems. KENNY, in an appendix to a report on British Guiana by GIGLIOLI (p. 286) shows forcibly how houses badly screened become mosquito-traps. At a mining centre on the Berbice River many people lived in screened wooden houses with cracks in floors, walls and roofs, and where the doors were carelessly left open. Mosquitoes could be captured by the hundred in these houses and 83 per cent. were anophelines and nearly all of these *A. darlingi*. The occupants had a blood parasite rate of 36 per cent. and many were carriers of gametocytes. Among the *A. darlingi* dissected 88.8 per cent. contained

the interior of French Guiana and in Cayenne to be. spleen rates 44 and 12 respectively, parasite rates 24 and 6, and gametocyte carrier rates 7 and 0.3.

Little seems to be known about malaria in the Amazon Valley of Brazil; hence the value of a report by CAUSEY and MELLO (p. 287) of two surveys carried out, one in December 1942, when infection rates are expected to be low, the other in June 1943, at the end of the wet season. The parasite rate, strange to say, was lower in the second, 3.3 per cent. among 27,103 examined, than in the first, 5 per cent. among 19,629. The explanation probably is that after the first survey atebirin had been widely distributed and anti-mosquito work undertaken. The chief vector is *A. darlingi*.

Soro (p. 815) records a survey he made in the Medellin Valley and Itagüi, Colombia, 1,500–1,950 metres above sea-level. The spleen rate among 3,700 individuals between 5 and 19 years of age was 22.1 per cent. Infection is mainly by *P. vivax*, being eight times as frequent as that by *P. falciparum*.

WILSON, M. E. and WILSON, D. B. (p. 97) made examinations fortnightly of the blood from 137 African soldiers stationed in a hyperendemic area of East Africa. Here the soldiers were exposed to frequent reinfection by alien, if not new, strains of malaria parasites. Only three of them showed more than 10 crescentic forms per 500 red blood cells.

Conclusion is reached that not more than one per cent. of the soldiers became at any one time a probable infector.

In contradistinction to *A. funestus*, which bites almost entirely at night, *A. duren* is a common day-biting mosquito near Elizabethville, in the Belgian Congo, and may be found in human dwellings, but is more abundant in trees near water and its favourite breeding-places are shaded sections of rapid streams. It is a capable malaria vector, according to

(p. 1001) record that plantations of cocoa have replaced forest and the cocoa trees are protected by shade trees, immortelles, *Erythrina glauca* and *E. micropteryx*, and these immortelle trees are heavily parasitized by bromeliads, more than 60 per tree on an average; *Anopheles bellator* selects the bromeliad as its host-plant. This mosquito attacks the plantation workers, especially on damp days, or on the verandahs in the evening. Occasionally, it enters the building to feed but leaves for forest cover directly afterwards. Manual removal of bromeliads is costly and, indeed, not very practicable; they can be got rid of by spraying with copper sulphate solution. If the proposal of the Trinidad Government to abandon shade trees and protect the cocoa by rows of trees planted perpendicular to the prevailing wind should succeed, endemic bromeliad malaria should disappear from the centre of Trinidad.

Transfusion Malaria.

SHARNOFF, GEIGER and SELZER (p. 1002) record two cases of accidental transmission of malaria by blood transfusion. In one, the blood used had been stored for eight days and all attempts to detect the parasite, *P. malariae*, in the donor's blood failed. In the other, the donor had had fever in Porto Rico two years before. Clearly, storage of blood for eight days is no safeguard against infection, and it would be wiser not to use for transfusion blood from any person who had come from areas known to be malarious. RUBENSTEIN *et al.* (p. 292) have related cases arising after much longer periods than the last. In a paper stressing the hazards of transfusion malaria, they record five cases in which the time which had elapsed since the donor was last in an endemic malaria region was determined and it was found to range between 12 and 27 years. The interval between the transfusion and the onset of symptoms varied from 10 days in the case of *P. vivax* to 111 days with *P. malariae* infections. They point out that the dangers are all the greater now that many potential donors have been exposed to malaria. The risk is indicated by TALICE and RUBENSTEIN (p. 296) in two cases of *P. malariae* infections. One of these occurred nine years before, the other in Italy seven years before. Incidentally, NAGLEY (p. 296) reports what seems to be a relapse of *P. falciparum* infection after 17 years.

Pathology and Immunity.

THONNARD-NEUMANN (p. 520) has studied the blood and the bone-marrow in all three forms of human malaria infection and the pathogenesis of malarial anaemia, as it affects the red corpuscles, the reticulocytes and the haemoglobin. He did not find any increase in reticulocytes in the peripheral blood during the acute attacks, although they did increase in the bone-marrow; in other words,

of precipitins agglutinins and complement fixing substances. As regards the last the reaction depends on a genus antigen thus differing from strain specific immunity and antigens for this reaction in man may be prepared from *P knowlesi* and *P gallinaceum*.

SHANNON *et al* (p 11) showed chemically that mepacrine is localized chiefly in the liver and less in the spleen kidneys and leucocytes. JAILER (p 11) determined by means of the fluorescent microscope that most was stored in the liver parenchyma cells and little in the Kupffer cells none in the sinusoids.

great for rabbits as for fowls. In pregnant rabbits the drug could traverse the placenta and be stored in the foetus.

Clinical

SHUTE (p 8) has written a paper on the clinical features of malaria which is of particular value in view of malaria infection in returned soldiers and COGGESHALL (p 29b) showed from observation of more than 3 000 returned service men how prone the Pacific strains of *P vivax* are to cause relapse 57 per cent had had more than 14 acute attacks and some had had as many as forty. Splenomegaly was not marked and anaemia and cachexia were absent. Further in regard to Pacific strains of this plasmodium NOE *et al* (p 521) demonstrated that by leaving a certain number of patients infected with *P vivax* to remain untreated the cyclic recurrence at regular intervals observed in chronic *vivax* infections treated with mepacrine in the south western Pacific occur but rarely if at all.

HEILIG (p 520) contributed an interesting article indicating the many conditions which malaria may simulate or perhaps it would be more correct to say many conditions which are basically malarial such as pneumonia pleurisy with effusion coronary thrombosis hepatitis biliary colic dysentery and enteritis. Most and HAYMAN (p 1004) mention some unusual clinical manifestations of *P vivax* infections for example signs indicative of abdominal disease meningitis (stiff neck and fever) convulsions urticaria angioneurotic oedema symptoms of pneumonia also trauma and surgical operations may reactivate malaria. Some of these unusual forms of malaria may lead to un-

case of a man intermittently in fact almost continuously incapacitated by severe headaches. He had suffered much of many physicians had had Kahn tests carried out repeatedly had undergone psychiatric and physical examinations and even longer had not had *P vivax* was seen quinine and

LAHA (p 9) reports two cases of malaria [type not mentioned] associated with signs of nephritis. One cleared up rapidly on small doses of quinine the other patient improved temporarily but died of uraemia a month later [The association of nephritis and quartan malaria was noted years ago by

GIGLIOLI in British Guiana. See this *Bulletin*, 1930, v. 27, 508, for a review of Giglioli's book *Malarial Nephritis*.
 TUMULTY *et al.* (p. 819) investigated the organic and psychological of recurrent *P. vivax* malaria in a number of soldiers.

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ANDREW (p. 522) observed a number of cases of *P. vivax* malaria in which the patients complained of sudden attacks of neurotic patterns. Hospitalization tended to be marked physically.

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BYSTROV (p. 294) records more cases of a fulminating and fatal type of "benign" tertian malaria to which he first called attention nearly 20 years ago. Most of the cases occur in patients between 4 and 16 years of age. The attack is accompanied by repeated vomiting, followed by loss of consciousness, convulsions and death. The spleen is enlarged and there is cerebral oedema; the fatal termination is attributed to the latter and the increased intracranial pressure resulting therefrom. *P. vivax* is seen in smears of the blood and of the organs, most in the schizont stage.

JENNINGS (p. 623) puts on record yet another case of serious malaria (cerebral with coma) in a man who, having for months while in a malarious district taken his prophylactic dose daily, leaves it off when departing from his station for England. He had a heavy malignant tertian infection.

OSGOOD (p. 92) relates cases of malaria, *P. vivax* infections, in women living in Oregon State, where malaria till then had not been known. A soldier, a relative of one of the patients, had returned from the Pacific where he had contracted malaria and was living in a tent 50 feet away. *A. maculipennis* was common in the neighbourhood.

RAPER *et al.* (p. 8) describes cases in African natives in which, in spite of dividing forms and mature schizonts being seen in the peripheral blood, the infection was running a mild course. The patients were immune, or partially immune, coming from districts where malaria transmission occurs for a short period annually. In one case, for example, no treatment was given, yet the temperature became normal on the fifth day and no parasites were seen in the blood after the seventh day.

Psychotic conditions including depression, anxiety, mania, hallucinations, delusions and even suicidal tendencies occur in infections by *P. vivax* or *P. falciparum*, as recorded by Büsow (p. 297); the duration of attack is variable, but even when they are prolonged the outlook is favourable.

PROKOPENKO (p. 8) carried out observations on three estates of Uzbekistan (Middle Asia) where outbreaks occurred affecting practically all the people. Most suffered from subtertian infection, but many had benign tertian parasites as well; quartan was rare. All were treated with acridine (mepacrine) and plasmodicide (pamaquine) and mosquito breeding-sites were attended to. The main source of infection appeared to be symptomless carriers.

BOOKLESS and NAFTALIN (p. 199) report on the unexpected results of the early stages of the disease in the early stages absent and early

But though the parasites disappear with antimalaria treatment symptoms continue—rose spots pea soup stools etc. It is to be noted that antimalaria drugs are no obstacle to the success of haemoculture for *Bact. typhosum*. SCOTT (p. 200) remarks in comment that the peculiarities in particular the mildness of the attack of this association of malaria and typhoid fever had been

[To be continued]

MALARIA

SAPERO J. J. The Malaria Problem Today Influence of Wartime Experience and Research. *J Amer Med Ass* 1946 Nov 16 v 132 No 11 623-7

FALCON TREJO A. Paludismo en el ambiente rural [Malaria in a Rural Environment]. *Med Colonial* Madrid 1946 Apr 1 v 7 No 4 353-6

In some rural areas in which endemic malaria prevails there is a tendency to

examination of thick blood smears and when necessary a differential white blood cell count may help to avoid errors. On the other hand malarial infections may simulate other diseases. In the Extremadura Province of Spain dysenteric forms of *P. falciparum* infections are not rare. Norman White

PAMPANA La malaria nella ex Jugoslavia Studio Riassuntivo [Malaria in Yugoslavia]. *Riv di Malariologia* Sez I 1941 Mar-June v 20 Nos 2/3 205-96 7 figs & 1 map [21 refs.] German summary (4 lines)

CASINI G. Notizie e rilevi sull'epidemiologia della malaria in Albania fino a 1939-40 [The Aftermath of the Malaria Epidemic in Albania 1939-40]. *Riv di Malariologia* Sez I 1941 Mar-June v 20 Nos 2/3 75-115 11 maps German summary

FRITZGERALD P. J. Malaria at a Caribbean Base. *US Nat Med Bull* 1946 July v 46 No 7 1140-52 2 figs [17 refs.]

This report describes malaria incidence in the U.S. Naval Station at Guantanamo Bay, Cuba. Guantanamo Bay is on the southern shore of the eastern tip of Cuba in Oriente Province. A malaria survey of Oriente Province was made by CARR and his colleagues [this Bulletin 1940 v 37 664] and BROWN and WARE's observations on mosquito and malaria control in the Caribbean Area [this Bulletin 1942 v 39 436] were made at Guantanamo. The United States has maintained a permanent naval station there since 1903. Large scale constructional work in 1940-41 led to an exacerbation of the previously very mild endemic malaria. Imported labour introduced new strains of infection and man's activities increased the breeding facilities for *A. albimanus*, the local vector. Mosquito control measures begun in 1943 averted a large outbreak. In 1945 there were 141 service and 52 civilian cases of malaria recorded, the highest incidence recorded in 16 years. Most of the patients had visited the

nearby cities of Guantanamo and Santiago de Cuba and probably acquired infection there. Rainfall was light in 1945 and very few anophelines were found in the Guantanamo Base.

P. falciparum infections were three times more numerous than *P. vivax*. Among 381 malaria cases there were 16 *P. malariae* infections, four of which were possibly acquired locally. Clinically malaria at Guantanamo Bay is of a mild type.
Norman White.

WOODHILL, A. R. & LEE, D. J. The Subspecies of *Anopheles amictus* Edwards (Diptera, Culicidae). Reprinted from *Proc. Linnean Soc. New South Wales*. 1944, v. 69, Pts. 1-2, 62-6, 8 figs.

By the breeding of series from isolated females the authors have shown that there are two forms the "Hill's variety" from the northern part of the eastern part of Queensland to the New South Wales border. *A. amictus hilli* occurs in the above areas but also in Dutch New Guinea; older records from Dutch New Guinea undoubtedly refer to the subspecies *hilli*. Some additional characters for the identification of the type form are given and for *hilli* the female, male, larva and egg are described in full and the chief morphological details are figured.
H. S. Leeson.

WOODHILL, A. R. & LEE, D. J. Some New Records and New Synonymy of Australian Species of *Anopheles* (Diptera, Culicidae). Reprinted from *Proc. Linnean Soc. New South Wales*. 1944, v. 69, Pts. 1-2, 67-72.

The distribution is recorded of *Anopheles meraukensis* Venhuis and *A. novaguinensis* Venhuis on the mainland of Australia. Both species were latter as *Anopheles punctulatus* to specific rank. They also Walker and *A. novaguinensis* Venhuis. The original descriptions were in Dutch and are here presented fully translated into English.
H. S. Leeson.

YOUNG, M. D., STUBBS, T. H., ELLIS, J. M., BURGESS, R. W. & EYLES, D. E. Studies on Imported Malarias. 4. The Infectivity of Malarias of Foreign Origin to Anophelines of the Southern United States. *Amer. J. Hyg.* 1946, May, v. 43, No. 3, 326-41, 1 fig.

Previous reports have described the methods used in these studies [this *Bulletin*, 1946, v. 43, 5]. The present observations were carried out in laboratories in Texas, North Carolina and South Carolina. Mosquitoes in lots of 100 or more were fed upon patients with relapsing malaria acquired overseas. After feeding the mosquitoes were placed in an insectary with a temperature between 74 and 80°F. and high relative humidity. More than a million mosquitoes were handled:—982,613 *A. quadrimaculatus*, 3,170 *A. punctipennis*, 1,075 *A. pseudopunctipennis*, 3,731 *A. walkeri*, and 13,014 *A. albimanus*. The origins of the infections were:—South Pacific 117, Mediterranean 40, Caribbean 6, Liberia 1, Burma 1. There were 2 *P. falciparum* infections; the remainder *P. vivax*. Sixty-one per cent. of the patients infected mosquitoes: the infection rate of 6,247 mosquitoes dissected was 30.8 per cent. *A. quadrimaculatus* transmitted infections to neurosyphilitic patients.

The average gametocyte count in the relapses was 3.4 per 100 white cells. The patient who had had most relapses, 24, and the patient with the longest

duration of the disease, 31 months both infected mosquitoes. The average length of the sporogenous cycle of *P. vivax* in *A. quadrimaculatus* was 10.7 days, the shortest 8 days.

A numerical evaluation of the relative susceptibility to infection of four species of *Anopheles* was — *A. punctipennis* 100, *A. quadrimaculatus* 98, *A. pseudopunctipennis* 40, *A. albimanus* 2. Too few *A. walkeri* were dissected to justify comparison. Norman White

LIFSCHITZ, J., UMANA, A. C. & VARGAS, J. J. Hallazgo de *Anopheles* (Nueva) [Presence of *Anopheles* (Nueva)] Inst. Med. Regional, Tucuman, 1-55 1 map [Summary in English by the author]

"(1) We found as a possible vector in the zones of Port Iguazu, Iguazu-Cuê (Port Aguirre), Port Benberg and Port Eldorado the *Anopheles* (N) *darlingi* Root, during the malarial epidemic we had in February-March 1946.

"(2) In 260 dissections of *Anopheles* (N) *darlingi*, caught full of blood in houses we found 5 stomachs with young oocysts the proportion obtained being 1.92 per cent."

HACKETT, L. W. The Malaria of the Andean Region of South America. *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico 1945, Dec., v. 6, No. 4, 239-52 [13 refs.]

Anopheles pseudopunctipennis is responsible for a great amount of malaria on both slopes of the Andes from northern Argentina to Colombia. It breeds in unshaded pools of clean fresh water containing green algae, along the margins or in the beds of hill streams and is thus specially adapted to mountainous regions with a long dry season. It is responsible for endemic malaria at heights ranging from 200 to 2500 metres above sea level. Cold in Argentina and increasing dryness in Chile determine the southern limits of its prevalence 31°S in Argentina 20°30'S in Chile. The upper limit of its breeding is not a fixed point in any valley; it varies from year to year. Water temperature is probably the limiting factor. It is probably the highest malaria vector in the world; it is responsible for malaria in the Cuzco Valley of Bolivia above the town of Camargo where the Quebrada de Tota is above 2600 metres throughout its entire length.

A. pseudopunctipennis breeds in an uninterrupted belt on both slopes of the mountain range from Argentina to New Mexico but between Ecuador and Guatemala and again north of the Valley of Mexico it loses much or all of its capacity to transmit malaria. It is probably not a homogeneous species but consists of two or more varieties as does *A. maculipennis* in Europe. Norman White

CASTILLO, R. L. Une revue des anophèles de l'équateur [A Survey of the *Anopheles* of Ecuador.] *Rev. Paludisme et Med. Trop.* 1946, Oct. 15, v. 4, No. 29, 237-8.

The author lists the species of *Anopheles* of Ecuador which he has encountered on expeditions during the last four years. He arranges them into three groups corresponding to the geographical regions of the country and notes their importance in relation to malaria.

Along the Pacific coast *Anopheles albimanus* is the chief vector (3-15 per cent of infections). *A. punctipennis*, though a vector in Panama and Colombia, was not found infected in Ecuador. *A. aquasalis* is suspected, but not proved.

to be a vector. *Chagasia bathanuss*, *Anopheles eiseni*, *A. pseudopunctipennis levicastilloi*, *A. apimacula*, *A. mediopunctatus*, *A. neomaculipalpus*, *A. triannulatus flavisi* and *A. neivai* are of no importance.

In the inter-Andean area the most dangerous anopheline is said to be *A. pseudopunctipennis rivadeneirai*; 5-20 per cent. have been found infected in nature (this is a new member of the *pseudopunctipennis* complex and no figures are given of the number of dissections made). *A. eiseni* and *A. punctimacula* are also found here.

In the Amazon region, east of the Andes the vector is *A. darlingi*; *A. boliviensis* is suspected and *A. bambusicolis*, *A. oswaldoi* and *A. kompi* are of no importance. [See also this *Bulletin*, 1946, v. 43, 262.] *H. S. Leeson.*

ARNOLD, E. H., SIMMONS, S. W. & FAWCETT, Dorothy G. Precipitin Technique for determining Mosquito Blood Meals. *Pub. Health Rep. Wash.* 1946, Aug. 23, v. 61, No. 34, 1244-9, 6 figs. (4 on 2 pls.).

The Rice and Barber modification of the Uhlenhuth-Weidanz precipitin test has been used by the authors on over 150,000 mosquitoes including *Anopheles quadrimaculatus*, *A. pseudopunctipennis*, *A. albimanus*, *A. punctipennis*, *A. crucians*, *A. freeborni*, and *A. punctulatus*.

The method is described and illustrated by photographs [see this *Bulletin*, 1935, v. 32, 807]; a sample "daily work sheet" and a "host and habitation summary sheet" are shown. No results are given. *H. S. Leeson.*

PERVES, M. Observations de paludisme héréditaire et congénital. Paludisme du nourrisson. [Hereditary and Congenital Malaria and Malaria of Infancy.] *Rev. Paludisme et Méd. Trop.* 1946, Feb. 15, v. 4, No. 23, 33-6.

— Transmissions héréditaire et congénitale du paludisme à *Pl. falciparum*. Influence de la maladie sur les premiers mois de la vie. [Hereditary and Congenital Transmission of *P. falciparum* Malaria: Influence of the Disease on the Early Months of Life.] *Ibid.* July 15-Sept. 15, No. 28, 193-203, 1 chart.

On the upper reaches of the Nyong in the French Cameroons is a swampy forest area where trypanosomiasis, malaria and leprosy have long flourished. To alleviate the conditions, the administration of this Upper Nyong region was entrusted to a group of doctors. It is here that the observations recorded were carried out.

Autopsies were made on four stillborn infants. In the spleens of three of them, schizonts of *P. falciparum* were found; in one spleen a rosette and two macrogametes were also seen.

In the maternity clinic at Abong M'Bang blood smears from finger and umbilical cord, of both mothers and infants, are examined. Among 661 infants and 651 mothers, 50 per cent. of the mothers and 10 per cent. of the infants harboured parasites. These were all *P. falciparum* infections, except 3 maternal *P. vivax* infections. *P. falciparum* gametes were found in 25 mothers and in 8 infants. Congenital infections are thus by no means rare, but clinical manifestations of malaria have not been seen by the author during the first two months of an infant's life. From then onward, clinical malaria becomes increasingly prevalent. From the end of the fifth to the eighteenth month spleen and parasite rates oscillate between 35 and 45 per cent. Thereafter the rates decline. Troubles of dentition appear to determine and to aggravate malaria attacks. The two most common forms of malaria attacks in infants are gastro-intestinal and pulmonary; the first clinical manifestation is

frequently dysenteric. Twenty five per cent of infants born alive die during the first two years of life. pulmonary affections and malaria are responsible for most of this mortality

Norman White

COGGESHALL, L. T. Certain Experiences with Malaria during World War II
Rev Inst Salubridad y Enfermedades Trop Mexico 1945, Dec v 6
No 4, 229-37

This paper describes the importance of malaria as a military medical problem during the late war and ably covers familiar ground. The success achieved by mepacrine as a suppressive is acclaimed —when the plasma level was maintained at 20 gamma or more almost perfect protection against clinical malaria was obtained. The tenacious character of *P. vivax* malaria acquired in the South Pacific is illustrated, in spite of which enlarged livers and spleens were not common, even in patients who had suffered many relapses. Among 1,424 men examined during their symptom free period, only 3 per cent had palpable spleens and only one per cent had palpable livers. The men had also, a high degree of physical fitness. During symptom free periods parasites were found in 81 per cent of blood examinations (4,853 smears examined). The most common complication noted between clinical attacks was headache. On the whole, malaria during the war was a great deal more troublesome than had been anticipated but less fatal.

Norman White

JENNINGS G. H. Cerebral Malaria in Britain [Correspondence] *Brit Med J*, 1946 Dec 7, 875

Report of a further case

DZUGOSZ, H. A Case of Blackwater Fever observed in Britain *Edinburgh Med J* 1946 Aug, v 53 No 8, 450-57, 2 figs

the text]

B. G. Macgranth

ODE, K. R. Spontaneous Rupture of the Spleen during a Malarial Rigor.
Med J Australia 1946 Sept 21 v 2 No 12 414-15

This is an account of a patient who was admitted to hospital by ambulance at night with a provisional diagnosis of malaria but without a history of it. He had suffered from severe dysentery in the Tropics and had ceased taking suppressive "atebrin" six weeks previously.

The patient had a temperature of 101°F and slight epigastric and left hypochondriac tenderness. His spleen was thought to be palpable. In view of the negative history and the absence of proof of malaria the patient was put under observation. On the next day and the succeeding morning he was symptom free and walked to the bathroom. At midday he felt nauseated and

had a mild rigor. "A blood smear was examined, with a positive result" [nature of result not stated]. That afternoon at 2 o'clock 10 grains of quinine were given orally; half an hour later the patient developed signs of shock, later complaining of pain over the renal angle, and exhibiting a lax abdomen and splenic tenderness. Treatment with intravenous serum and, later, by repeated blood transfusions, was given: in the interval the patient collapsed completely and by 4 p.m. he was comatose and almost pulseless. Further blood transfusions, "Coramine", adrenalin, and serum were given, and whilst preparations were being made for continuing the blood transfusions the patient died, at 8.30 p.m.

At post-mortem, pints of blood clot and serum were found in the peritoneal cavity. The spleen measured about 12 in. by 6 in. by 4 in. and weighed approximately four pounds; a rupture covering an area of about 6 square inches was present on its postero-inferior surface.

The author records this case as one with which any practitioner may be faced; and he discusses the differential diagnosis, the possibility of surgical intervention and the question of whether the immediate administration of quinine from the time of the patient's admission would have altered the outcome.

[The writer states "In accordance with the usual routine treatment in an unproven case of malaria, and indeed in view of the largely negative history, the patient was placed under observation." It is not clear why, "with a provisional diagnosis of malaria", there is no record of blood films having been examined on the patient's admission to hospital, in the middle of the third day.]

MATILLA, V., COVALEDA, J. & APARICIO GARRIDO, J. El estado inmunitario de los indios "bubis" de Fernando Poo frente a la infección palúdica. *State of Immunity against Malaria of the Bubi Indians of Fernando Po. Study of their Splenomegaly.* *Med. Colonial.* Madrid. 1946, Apr. 1, v. 7, No. 4, 309-17, 1 chart. [12 refs.]

The Bubis are the dominant native race of the isle of Fernando Po. The authors examined 587 young people of the race for enlargement of the spleen and record their findings in six age groups:—0-1, 1-3, 3-5, 5-9, 9-14 and 14-20. The global spleen rate was 58.6 per cent. The highest rate was in the 3-5 group, 88.5. The 0-1 rate was 59.5. In the 14-20 group the rate was 35.6. The Ross Index was highest in the 1-3 age group, 2.50; thereafter the size of the spleens decreased. There was no size IV spleen in the 9-14 age group, and no III spleen in the 14-20 group. There was no significant difference between the rates for the two sexes.

Norman White.

MAKARI, J. G. The Cephalin-Cholesterol Flocculation Test in Chronic Malaria and its relation to Endemicity. *J. Trop. Med. & Hyg.* 1946, Oct.-Nov., v. 49, No. 5, 92-4, 2 figs.

The author refers to a previous paper [this *Bulletin*, 1946, v. 43, 623] concerning the cephalin-cholesterol flocculation test in 105 patients suffering from malaria. There were 92 American refugees at Anjar among them, and he has been able to follow a group of these patients during the early period of high endemicity and subsequently during the period of low endemicity which followed successful mosquito-control measures. The patients, 46 in all, were studied over a 2½-year period, being examined in February 1943, August 1943 and August 1945.

The following data were obtained —

	First interview February 1943	Second interview August 1943	Third interview August 1945
	Per cent	Per cent	Per cent
Last attack within two months	100	—	20
Positive splenic enlargement	76	60	27
Positive hepatic enlargement	12	55	50
Positive smear for malaria parasites	60	—	0
Positive C C F test	92	91.5	52

The author notes the fall in the C C F rate the spleen rate and the parasite incidence with the drop in endemicity. Tables are given which show correlation coefficients: there was a moderate correlation between the C C F test and the liver and splenic enlargements and a very high negative one between that test and the duration of malarial infection—the shorter the infection the stronger the test. There was also a fairly high positive correlation between the C C F test and the last chill in months. On the analogy of the behaviour of

v. 37: 862] on malaria as a disease of the reticulo-endothelial system and concludes that it would seem that the longer the stimulation of the malaria parasites to the reticulo-endothelial system the longer the time required for the system to go back to normal.

In this proposition he finds an explanation for the persistence of a fairly high C C F rate and hepatic enlargement in his group of patients even after the marked reduction in endemicity.

H. J. O. D. Burke Gaffney

BECKER I. T. KAPLAN L. I. & READ H. S. in collaboration with M. F. BOYD
Variations in Susceptibility to Therapeutic Malaria. *Amer. J. Med. Sci.*
1946 June v. 211 No. 6 680-83 4 figs.

Malaria therapy was used in the treatment of 225 white and 75 Negro soldiers suffering from various types of neurosyphilis. From the experience thus gained certain conclusions emerge. Negroes should be inoculated with *P. malariae*; they are commonly refractory to *P. vivax* infection. For white patients with no history of naturally acquired malaria *P. vivax* infections generally give satisfactory results. Of the white patients in this series 80 per cent of them were susceptible. Ninety-three per cent of white patients from other parts of the United States were satisfactorily treated with *P. vivax*. If there be a history of malaria or if the patients come from malarious regions overseas *P. malariae* should be used. If there be a spontaneous remission of a *P. vivax* infection before the patient has had a sufficient febrile reaction, reinoculation with *P. malariae* is advocated if the patient has had 3 paroxysms or less.

reaction; the therapeutically inadequate infection can then be terminated and reinoculation done more promptly than would be possible otherwise. *P. vivax* parasitaemias usually average from 20,000 to 40,000 per cmm. and rarely exceed 50,000. Parasitaemias in *P. malariae* infections rarely attain 20,000 per cmm. The danger line in *P. falciparum* infections is from 100,000 to 200,000 per cmm. *P. falciparum* was only used in 3 cases; the three patients were immune to both *P. vivax* and *P. malariae*. Three-grain doses of quinine are given hourly as long as the temperature in *P. falciparum* infections exceeds 104°F. or when the parasite count exceeds 100,000 per cmm.

Norman White.

KAPLAN, L. I., READ, H. S. & BECKER, F. T., in collaboration with M. F. BOYD.

Use of Quantitative Parasite Inoculation Doses in *Plasmodium vivax* Malaria Therapy. *Arch. Neurology & Psychiatry*. 1946, July, v. 56, No. 1, 65-73, 4 figs.

It is pointed out that in malarial therapy for general paralysis a period of remittent fever of several days' duration precedes the establishment of the malarial paroxysms, which alone are of therapeutic value. The preliminary febrile period is often accompanied by severe malaise and exhaustion, which debilitates the patient to such a degree that he is unable to support well the therapeutic paroxysms when they occur. With the object of discovering a method of infection which would eliminate this preliminary period, various methods of inoculation were investigated in 265 patients. For intradermal inoculation 0.2 cc. of blood containing between 1 and 2 million parasites was inoculated in four portions of 0.05 cc. into four weals on the forearms. In 26 patients 42.3 per cent. showed no preliminary period, while 76.9 per cent. showed a preliminary period of two days or less. Although from the point of view of elimination of this period this method of inoculation gave the best result, it was found to be unsatisfactory in that 18.8 per cent. of the cases failed to become infected. In the case of intravenous inoculations, it was found that the higher the parasite dose the longer was the preliminary period of remittent fever. When the dose was reduced to one of 1 million parasites the period was eliminated in 35.7 per cent. of the cases and was two days or less in 67.9 per cent.

It is recommended that in the treatment of neurosyphilis the standard procedure be the intravenous inoculation of 1,000,000 *P. vivax* parasites in the case of susceptible white patients. As regards cycles of a tertian character, these were noted in 57.8 per cent. of the cases inoculated intradermally, while in cases inoculated intravenously they were most commonly noted in those receiving the lowest doses. Thus they occurred in 25 per cent. of those receiving 26 to 150 million parasites; 31 per cent. for doses of 6 to 25 million, 32.1 per cent. for doses of 2 to 5 million and 42 per cent. for doses of 1 million. In 58 cases in which mosquito transmission was practised, the preliminary period was three days or longer in 62.1 per cent., while only 22.4 per cent. showed tertian cycles.

C. M. Wenyon.

WINCKEL, W. F. Trois siècles d'usage du quinquina et de la quinine dans la thérapeutique du paludisme [Three Centuries of Quinine in the Treatment of Malaria.] *Rev. Paludisme et Méd Trop.* 1946, Nov. 15-Dec 15, v. 4, Nos. 30/31, 272-8. [Refs. in footnotes.]

BANG, F. B., HAIRSTON, N. G., MAIER, J. & TRAGER, W. Studies on Atabrine (Quinaerine) Suppression of Malaria. I. A Consideration of the Individual Failures of Suppression. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 649-61, 7 figs. [13 refs.]

These studies of atabrine (quinacrine, mepacrine) suppression of malaria were made in the S.W. Pacific area from June 1943 till January 1945. The earlier

report of FIELD in 1934 [*Bull Inst Med Res Federated Malay States*, No 2] had shown the value of the drug as a suppressant in native populations previously exposed to infection. The more recent work on the pharmacology of atabrin by SHANNON *et al* [this *Bulletin*, 1945, v 42, 343] and on methods for its estimation by BRODIE & UDENFRIEND and by MASEN [this *Bulletin*, 1944, v. 41, 453, 1945, v 42, 8] proved of great help in the present investigations. The view by the resultant pl [MARSHALL & DEAR (see below p 292)] have however, recently questioned the validity of this conclusion. The present experiments were carried out partly with troops after

adequate. Clinical malaria developed when the drug was present in inadequate

There was a considerable overlap between the concentrations in protected and non protected individuals. The authors believe that 'atabrine suppression is mainly a problem of drug administration'.
J D Fulton

FAIRLEY, N H. Researches on Paludrine (M 4888) in Malaria. An Experimental Investigation undertaken by the L.H.Q. Medical Research Unit (A.I.F.), Cairns, Australia. *Trans Roy Soc Trop Med & Hyg* 1946, Oct, v 40, No 2, 105-53, 16 charts & 2 figs [13 refs]. Discussion 153-62 [WENYON, C M, SINTON, J A, DAVEY, D G, CHESTERMAN, C C, MURCATROYD, F, STANNUS, H S, KING, J D, FAIRLEY, N H. (in reply)].

Following the results obtained with the chemically closely related drugs M 4430 and M 4888 (paludrine) against different species of bird malaria by CURD, DAVEY & ROSE [this *Bulletin*, 1946 v 43 400] researches on the therapeutic, suppressive and causal prophylactic properties of paludrine were undertaken by the Medical Research Unit at Cairns, Australia. Healthy volunteers infected with the sporozoites of New Guinea strains of *P. vivax* and *P. falciparum* as well as troops infected during the S.W. Pacific campaign, were used in these experiments. Their scope has been described [this *Bulletin*, 1946, v 43 527] and some further work is now included in the present report. Although the clinical response to treatment was not very rapid paludrine proved more efficient than any other drug in the radical cure of malignant tertian malaria, by the standard course of 100 mgm thrice daily for 10 days (total 3.0 gm). In benign tertian malaria a total dosage of 0.1 to 14.0 gm was used in treatment. Clinical response to therapy in this infection was not more rapid than with quinine or atabrin and while radical cure of sporozoite-induced infections was not regularly obtained relapses were fewer than after treatment with other drugs. In a limited number of cases of quartan malaria, there was a rapid clinical response to paludrine administration but parasites disappeared only slowly from the blood and it was not decided whether radical cure had been effected. In dosage of 100 mgm daily the drug proved adequate for suppression of *P. vivax* and *P. falciparum* infections. In well-tolerated

doses it acted as a true causal prophylactic in the latter infection and as a partial causal prophylactic in the former. Plasmoquine has similar properties but must be given in doses too large to be tolerated. In a field type of experiment, during which volunteers were repeatedly bitten by mosquitoes infected with *P. vivax* and *P. falciparum* over a period of 62 days while being subjected to strenuous conditions of exercise and cold accompanied by injection of adrenaline and insulin, 100 mgm. of paludrine daily kept the blood free from parasites and all symptoms of malaria were absent. Some time after administration of drug overt *vivax* but not *falciparum* malaria developed. From a careful study, in which the drug was administered at different times relative to the bites of mosquitoes infected with *P. falciparum*, it was concluded that pre-erythrocytic forms of the parasite (not yet demonstrated) were more susceptible to its action than were sporozoites or asexual erythrocytic forms. The important conclusion was reached—"that 50 to 100 mg. administered twice weekly at 3 to 4 days interval, should afford complete causal prophylaxis against *P. falciparum* infections." In view of the ability of paludrine as a schizonticide to bring about clinical cure of malarial attacks in non-immunes, it seems probable that epidemics among native populations could be controlled by a single weekly dose. The factors involved in the treatment of native populations are discussed and the author suggests that, with paludrine available in adequate quantities, the radical cure of native populations is now feasible, for subsequent epidemics could be controlled if they occurred, but he agrees that long-term field investigations are indicated. Paludrine is not gametocidal in the human host, but prevents complete development in the mosquito. It has a powerful action against early schizonts by preventing division of chromatin and merozoite formation. In therapeutic doses, it produces no significant toxic effects, nor were any such effects noted in patients who received a course of 300 mgm. daily for three weeks followed by a dose of 100 mgm. twice weekly over a period of six months. By the latter treatment the number of relapses in *vivax* malaria was greatly reduced. The value of quinine-plasmoquine and paludrine-plasmoquine therapy, regarding the incidence of radical cure in *vivax* infections, is meantime being assessed in large numbers of patients.

J. D. Fulton.

CURD, F. H. S. & ROSE, F. L. A Possible Mode of Action of "Paludrine".
[Correspondence.] *Nature*. 1946, Nov. 16, 707-8.

While seeking an explanation of the mode of action of paludrine it was found that this potent antimalarial formed a copper complex in which one atom of the metal was associated with two molecules of the drug. The construction of space models of this compound indicated several points of resemblance between it and naturally occurring porphyrin pigments. It is suggested that paludrine may exercise its antimalarial action through interference with the porphyrin metabolism or enzyme systems of the parasite. [Many investigations on the respiratory enzymes of malaria parasites have been reviewed (this *Bulletin*, 1938, v. 35, 709; 1945, v. 42, 448, 967; 1946, v. 43, 824, 825) and while haematin is known to be formed, further studies on porphyrin metabolism have not been reported.] Copper need not necessarily be the metal involved in such processes and provided the structural features of the complex are preserved activity may be shown even in the absence of a metal. Because of the low toxicity of paludrine and its inactivity against many other micro-organisms the authors consider that the suggested antagonism must relate to a highly specific porphyrin system in the malaria parasite.

J. D. Fulton.

JOHNSTONE R. D. C. Relapsing Benign Tertian Malaria treated with Paludrine
Lancet 1946 Dec 7 825-6

The following three different courses of treatment were carried out in rotation —

(1) Paludrine 0.05 gm daily for ten days

(2) Paludrine 0.5 gm daily for ten days

(3) Quinine gr 30 pamaquin 0.03 gm daily for ten days

Those who had received any treatment before admission to hospital were excluded but in every case there was a previous history of malaria.

Between July 1945 and March 1946 324 or 108 cases of each series were thus treated

When the patients arrived in the ward blood slides both thin and thick were taken and treatment instituted on those showing *Plasmodium vivax*. The drugs were administered in divided doses—paludrine twice daily the quinine-pamaquin three times daily after food. None of the paludrine-treated cases exhibited any digestive symptoms. Patients were confined to bed until they were afebrile for 48 hours.

In the first 240 cases blood films were examined on the 8th 9th and 10th days of treatment. The results of these investigations were negative for asexual parasites with the exception of one patient on quinine-pamaquin who showed scanty B.T. rings on the 9th day. Subsequently he remained free from relapse after six months. There was rapid response to all forms of treatment and little difference could be detected in results. The length of pyrexia after the start of treatment was —

Paludrine (0.05 gm)	1.49 days
(0.5 gm)	1.47
Quinine pamaquin	0.98

The remote response was obtained by the issue of a standard form requesting information regarding further relapses. Every patient has been followed up with one exception. The results are shown below —

TABLE 1 — Remote results of treatment

Course	No of cases	Free from relapses	One proved relapse	Two or more proved relapses	Clinical relapse	Percent relapsed	
						All cases	Proved cases
Paludrine (0.05 gm)	108	62	26	7	13	42.6	30.5
Paludrine (0.5 gm)	117	60	23	2	22	43.9	23.3
Quinine pamaquin	108	91	9	1	7	15.6	9.2

The quinine-pamaquin results obtained have been compared with a former series which showed relapse-rates of 10.3 per cent proved cases and 16.5 per cent total relapses. There is therefore no significant difference in the quinine-pamaquin results and those obtained with paludrine may be concluded to be approximately accurate.

In the total series 89 (27.4 per cent) were ex-prisoners of war from the Far East and these have been separately analysed. Owing to their privations the relapse-rate was higher than in other cases. They have however been included in the totals though it is realized that the total relapse-rate has been increased.

The time interval between arrival in England and admission to hospital was compared :—

	Average months in U.K.	Maximum
Paludrine (0.05 gm.)	3.26	11 months
" (0.5 gm.)	3.31	1 year
Quinine-pamaquin	3.13	9 months

Different strains of *P. vivax* may possibly cause relapses at different intervals :—

	India-Burma	Mediterranean	Far East	Others
Paludrine (average for both courses)	65.5	10.5	30	1.5
Quinine-pamaquin	64	14	29	1.0

Thus the area of infection does not seem to influence the relapse-rate.

The interval between treatment and proved relapse is assessed as follows :—

	Average number of days between treatment and relapse
Paludrine (0.05 gm.)	65.1
" (0.5 gm.)	53.0
Quinine-pamaquin	43.7

These figures have been vitiated to some extent by the practice of some who took occasional courses of mepacrine after leaving hospital, with the result that the relapse period might thereby have been prolonged.

P. Manson-Bahr.

DE OLIVEIRA, A. Novo medica nálico. [New
Chemo-Therapeutic Medicine : : : : : Brasileira Med.
Rio de Janeiro. 1946, Aug., [Summary in
English by the author.]

"After examining the properties of a number of compounds employed in malaria treatment and prophylaxis, the author studies a new synthetic, the chloro-diethyl-aminomethyl-butylamin-quinolein hiphosphate, so-called "W-7618", known in the market under the name of *Aralen*, and on which he comes to the following conclusions :—

attack and extinguishing the infection ;

"(III) it does not, like acridinic substances, cause yellowish pigmentation of the epithelial tissue."

SWELLENGREBEL, N. H. Malaria Control in the Netherlands. *Chemical Products*. 1946, Sept.-Oct., v. 9, Nos. 11/12, 98-102.

Benign tertian (*Plasmodium vivax*) is practically the only form of malaria endemic in the Netherlands ; the subject is dealt with in detail in the book "Malaria in the Netherlands" by N. H. Swellengrebel and A. de Buck, 1938,

Amsterdam Scheltema and Holkema In the present paper the author discusses how control of malaria in the Netherlands may be affected by certain recent events—the discovery of paludrine and DDT and the destruction of large numbers of domestic animals during the German occupation of the country

The mosquito vector is the shortwing (*atroparius*) variety of *Anopheles maculipennis* it prefers to breed in brackish water and malaria is therefore mainly limited to the coastal provinces called Friesland North Holland and Walcheren Island in Zeeland The mosquitoes feed and lay eggs during the spring and summer ceasing to lay eggs usually in August but continuing to

high

feed more on man and may spread malaria to places hitherto free

The Dutch strains of *P. vitax* have a long (7 to 9 months) incubation period in most infected persons infection takes place chiefly in the autumn after the egg laying period and fever appears in the spring and summer of the following year a circumstance that has an important bearing on control

Spraying of selected houses has been done with pyrethrum extracts fort

risk of infected mosquitoes returning to human dwellings and infecting other people is kept low by the counter attraction of animal houses—stabular deviation with the destruction of animals the increased risk can be met by an additional spraying with DDT early in July

There are many so-called healthy or presumptive carriers of *P. vitax* who naturally object to taking 15-grain doses of quinine twice a week it is thought that paludrine taken once a week to sterilize the blood will be more acceptable and more successful as a control measure

J F Corson

SWELLENGREBEL N H & KRAAY H 10 jaar spuitcampagnes tegen malaria [Ten Years of House Spraying against Malaria] Reprinted from *Nederl Tijdschr t Geneesk* 1946 Oct 12 v 90 No 41 1377-80 2 graphs [Summary in English by the authors]

A ten years observation on the effect of house spraying with pyrethrum

unsatisfactory

VINCKE I with the collaboration of M LIPS & R CAMBIER Note sur l'effet du DDT sur *Anopheles funestus* Giles [Note on the Effect of DDT on *A. funestus* Giles] *Ann Soc Belge de Méd Trop* 1946 June 30 v 26 No 2 175-84 1 chart

Since February 1946 experiments with DDT have been conducted against *Anopheles funestus* in a camp near Elizabethville Belgian Congo Large breeding places of this anopheline are nearby and the adult density has been under observation since May 1944 Figures are given to show that there is

considerable variation in the numbers of *A. funestus* frequenting different houses and also in the size of the blood-meal contained in the stomachs of captured females.

Four huts were selected and sprayed with different doses of 5 per cent. DDT in kerosene; controls were established and other huts were sprayed with pyrethrum. Examination of the *A. funestus* taken from the treated huts shows that DDT does not prevent the mosquitoes feeding; for example, in a collection of 26 *A. funestus*, 19 contained fresh blood, 12 of them with stomachs more than three-quarters full. The numbers of living anopheles collected from the DDT-treated houses remained low for at least two months but increased in huts sprayed with pyrethrum, indicating that the latter insecticide possessed some initial repellent effect which gradually diminished.

enter other houses and die there.

These experiments are regarded as preliminary and not entirely conclusive, but so far as they go the authors believe that they demonstrate that DDT is slow in action; that its toxic effect is lasting; that it has no repellent effect and that it cannot be used for personal protection. It is hoped to use DDT on a large scale against adult anophelines in parts of the town where the densities are highest and where breeding places are difficult to control. *H. S. Leeson.*

TRAPIDO, H. The Residual Spraying of Dwellings with DDT in the Control of Malaria Transmission in Panama, with special reference to *Anopheles albimanus*. *Amer. J. Trop. Med.* 1946, July, v. 26, No. 4, 383-415, 13 figs. on 3 pls. & 2 charts. [24 refs.]

In the summer of 1944, a field experiment was set up in the middle Chagres River, Panama, to study the effectiveness of DDT residual spray treatment of native dwellings in the control of malaria vectors and malaria. The area was one in which intensive studies of malaria and anopheles have been carried on by Dr. H. C. Clark and his associates at the Gorgas Memorial Laboratory during the past fifteen years.

The principal vector of malaria is considered to be *Anopheles albimanus*; this species [in contrast to *Anopheles gambiae*] does not rest in dwellings during

Panama Canal.

The three villages studied were accessible only by dugout canoe or foot trail; malaria rates based on thick blood film examinations were available on a monthly basis for ten years and on a bi-monthly basis for the last five years; one village was chosen for treatment, the other two being used as controls. Continuous and abundant production of malaria vector species occurred throughout the year. Trained native helpers and collectors were available.

The native houses are typical of the tropics with palm thatch roofs and walls of cane or board.

Mosquito population was assessed by band catching methods at night between the hours 6.30 and 9 p.m. and 5.30 and 6.30 a.m.; mosquitoes were conveyed to the laboratory in suitable cages for examination, counting and estimation of survival times. Horse-baited stable traps were found to give a reliable index of outdoor mosquito activity.

Five per cent DDT in kerosene was applied by pressure sprayers which were regular items of Army issue. A uniform rate of application was obtained by training spray operators to wet surfaces without permitting the solution to run. The interior of houses was comprehensively treated from ceilings or roof to floor and included furniture surfaces which might be used as resting places by mosquitoes. The exterior surfaces of walls and the undersides of overhanging eaves were sprayed. All outhouses and animal shelters were treated inside and outside. It was difficult to estimate quantities used but the average was approximately three gallons of solution per house. Second and third applications were made at intervals of four months.

Results—The period covered is from October 1st 1944 to December 2nd 1945.

(1) Mosquito population. There was an immediate dramatic drop in the numbers of anophelines in the treated village after the first treatment from 140 to below 10 anophelines per house per night. This gross reduction was maintained and reduced to practically nil after the third spraying about July 1st 1945. A progressive slight increase followed and in the absence of a fourth spraying the anopheline density reached 7 per house per night. The concurrent variations (associated with season and rainfall) in anopheline population in the untreated control villages are also given in statistical tables and the whole illustrated by chart.

(2) Mosquito engorgement. A marked and consistent difference between the percentage engorged in the control and treated villages was found. 27.4 per cent to 74.3 per cent in control villages and 0.0 per cent to 16.7 per cent in the treated village. Only at the end of the study period that is six months after the third spraying did the percentage engorged in the treated village approximate that at the control villages.

(3) Mosquito survival. Of engorged anophelines 4.2 per cent in the treated village survived four hours as compared to 35.3 per cent in the control villages. No significant difference between control and treated houses was evident six months after the third spraying.

It is indicated that DDT treatment tends selectively to reduce the malar transmission potential by affecting principally those mosquitoes concerned in transmission with each successive treatment the degree of control improves after the third spraying the malaria transmission potential being reduced 99.9 per cent.

(4) Statistics are given of stable trap catches which give an indication of the anopheline population outside the houses. The following tentative generalizations are made—

- (a) At times of great anopheline abundance a high degree of area control may be effected for two or three weeks by spraying of houses alone.
- (b) During a period of moderate anopheline abundance effective control for six weeks following house spraying may result.
- (c) House spraying three months prior to a period of great anopheline abundance is wholly ineffective in preventing the normal increase of Anophelines in an area.
- (d) The effects of spraying houses as indicated above may extend outwards some three hundred feet but no peripheral effect on anopheline population is evident at a distance of 900 feet.
- (e) Malaria incidence. The comparison of the malaria rates at the three villages appears in the following table and is based on the cumulative rate in individuals examined either five or six times during the year by the thick blood film method.

		Villages 1 and 2	Village 3	Difference
		Per cent.	Per cent.	Per cent.
¹ 1940-41 ...	...	45.6	33.3	-12.3
¹ 1941-42 ...	...	52.8	60.9	+ 8.1
¹ 1942-43 ...	...	39.7	46.7	+ 7.0
¹ 1943-44 ...	...	42.5	45.5	- 3.0

		First Spraying November 1st, 1944		
		Untreated Per cent.	Treated Per cent.	Per cent.
¹ 1944-45 ...	...	51.3	24.0	-27.3
¹ 1945 ...	...	52.0	14.8	-37.2

¹Annual rate based on the year September to August. ²Annual rate based on the year November to October. ³Annual rate based on the year January to December.

[This paper requires to be studied in the original by the hygienist, whose responsibility it is to apply the "residual insecticide" method of malaria control.]

R. Ford Tredre.

DEONIER, C. C., JONES, H. A. & INCHO, H. H. Organic Compounds effective against Larvae of *Anopheles quadrimaculatus*—Laboratory Tests. *J. Econom. Entom.* 1946, Aug., v. 39, No. 4, 459-62.

"Of the 6,000 organic compounds tested to determine their toxicity to fourth-instar larvae of *Anopheles quadrimaculatus* Say only 175 gave mortalities of over 50 per cent. in 58 hours at 1 p.p.m. Twenty-two compounds, in addition to DDT and related compounds, showed toxicity at 0.1 p.p.m. Acetic acid, 1-trichloromethyl-2,2-methylene bis(4,6-dichlorophenyl) diester, benzene hexachloride, and *Synthetic 3856* were superior to the other compounds in their toxicity to anopheline larvae."

RICHARDSON, A. P., HEWITT, R. I., SEAGER, L. D., BROOKE, M. M., MARTIN, F. & MADDUX, H. Chemotherapy of *Plasmodium knowlesi* Infections in *Macaca mulatta* Monkeys. *J. Pharm. & Exper. Therap.* 1946, July, v. 87, No. 3, 203-13, 3 figs. [13 refs.]

The authors are critical of techniques employed in the past for evaluating the effect of drugs on *P. knowlesi* infections in *Macaca mulatta* (*Macacus rhesus*) monkeys because of lack of standardization of the infecting inocula, as well as of dosage, time and rate of administration of drugs under test. They have used the intravenous route of inoculation and in chemotherapeutic tests gave 50 million parasitized cells per kilogram of body weight. On the day after inoculation in untreated animals, scanty parasites were generally detectable in the peripheral blood and on the 5th or 6th day 30 to 90 per cent. of the red cells were infected, and death of the host usually occurred on the 6th or 7th day after infection. In a series of 46 control animals so infected, four survived to become chronic—an unusually large proportion in this infection. By the 7th day 80.2 per cent. of the animals had died and those which survived for 11 days

remained alive indefinitely. The average day of death for the others was 63 ± 0.71 . Most of the animals reached a peak of infection by the sixth day and all of them before the tenth day. Three criteria were selected as an indication of the efficacy of drugs used in the treatment: mortality, the day of death and highest parasitaemia on the tenth day after infection. In the chemoprophylaxis test, the inoculum was prepared from an infected animal with 20 to 50 per cent of the red cells infected and each test animal was housed individually and received liberal diet. Blood counts were made at the same time daily. Drugs were given by stomach tube in a volume of 10 cc. per animal at each dose 18 hours after inoculation. Administration was continued for 5 days. To maintain a

were very active in *P. knowlesi* infections and that they could effect radical cure. The range of antimalarial activity of sulphadiazine has now been

of the drug. It was antagonized by *p*-aminobenzoic acid. By delaying the start of treatment with quinine and sulphadiazine until 72 hours after inoculation when the infection has become well established it was found that both drugs acted at the same rate and that the effective dose of each was approximately the same as when treatment was begun 15 hours after inoculation.

J. D. Fulton

HAAS V. H. WILCOX, Aimee DAVIS, Frances P. & EWING, Frances M.
Plasmodium gallinaceum Infection characterized by Predominance of
Exo-Erythrocytic Forms. *Pub Health Rep Wash* 1946 June 21,
v. 61 No. 25 921-S.

passage this type of infection ceased to develop almost entirely, only a very

infection concurrently with the appearance of exoerythrocytic forms in the brain and leptomeninges. The same results were obtained when sporozoite infections were carried out after serial blood passages had been made for still longer periods. As is well known, chicks subjected to blood inoculations were found to have exoerythrocytic forms in the brain after subsidence of the erythrocytic infection. Emulsions made from the brain at this time were inoculated into chicks subcutaneously. The infections which developed were of the exoerythrocytic type, with few or no parasites in the blood. Emulsions

of the brains of these chicks were inoculated to others. With each passage a decreasing number of chicks became infected, till, at the sixth, none became infected. Brain emulsions were also inoculated into the embryonic yolk of 7- to 9-day old embryos. The resulting infections, proving fatal in a few days, were of the exoerythrocytic type. Brains of these embryos were used for serial passages, which so far have been successful up to the fourth passage with the same type of infection. The authors suggest that the type of investigation carried out by them may be useful in the search for exoerythrocytic stages of development of mammalian malarial parasites.

C. M. Wenyon

BRACKETT, S., WALETZKY, E & BAKER, Margaret The Relation between Pantothenic Acid and *Plasmodium gallinaceum* Infections in the Chicken and the Antimalarial Activity of Analogues of Pantothenic Acid. *J. Parasitology*. 1946, Oct., v. 32, No. 5, 453-62 [16 refs.]

A guide to the synthesis of new antimalarials has been sought by studying the pantothenic acid requirements of *P. gallinaceum* in chicken hosts. Some of its analogues are known to possess chemotherapeutic activity in other infections and a number of these synthetic substances were tested for antimalarial activity. The *in vivo* method of approach was used because of the lack of a suitable method for *in vitro* cultivation of the parasite and also for the reason that the pantothenate requirements of the host were already well known. Attempts to correlate the intensity of a malarial infection in a particular host with dietary deficiencies have given somewhat conflicting results. In the present experiments, chickens were rendered pantothenate-deficient by feeding them, from the time of hatching, on a special diet in which pantothenate was absent but which contained all other essential factors, and as a result they did not grow normally. Pantothenic acid was added to the diet of the control birds. The chickens were infected when 11 to 19 days old by sporozoites or parasitized blood. It was found that blood-induced infections were much less severe in the case of the pantothenic-deficient birds than in the controls. In the former the number of merozoites per segmenter was reduced, a result believed to be due to deficiency of the vitamin and not to defence mechanisms of the host. Stages of the parasite which were affected by the synthetic analogues tested were also affected by pantothenate deficiency in the host and the activity of the former was antagonized by the latter substance. Sporozoite-induced infections in deficient and control groups of birds ran a normal course. In testing synthetic substances against standardized infections produced by sporozoites or parasitized blood it was arranged that in the latter case the peak of parasitemia should occur 4 or 7 days after inoculation. The drug was given in the diet and the birds were kept alternately in light and dark for three-hour periods. The most effective substance tested was pantoyltauramido-4-chlorobenzene which proved much more active than quinine in both types of blood-induced infection. None of the substances showed activity in sporozoite-induced infections. The above substance and 2-pantoyltauramido-5-bromopyridine apparently interfered specifically with the pantothenate metabolism of the blood form of the parasite and possibly with that of the host. The suppressive action of the synthetic substances was in each case antagonized by administration of pantothenate at the same time. The general conclusion is that pantothenate is necessary for the erythrocytic stages of the parasite. Exoerythrocytic stages may possibly find sufficient of this substance in their particular habitat. It is pointed out that these results are specific for *P. gallinaceum* in the chicken host and that the synthetic compounds tested may not necessarily prove active in other types of malarial infection.

J. D. Fulton.

MARSHALL E. H. JR & DEARBORN E. H. A Comparison of Drug-Diet Therapy with Single Daily Oral Dosage in Avian Malaria. *J Pharm & Exper Therap* 1946 Oct \ 88 No 2 187-9

The results obtained by giving sulphonamides for the treatment of infections in such a way that a constant level of the drug is maintained in the blood have established the value of the method in practice. Correspondingly favourable results have been obtained by treating ducks infected with *P. lophurae* in the same way by drug-diet therapy. A comparison has now been made of the results obtained with the above method and that of giving a single daily dose of drug over the same period in this infection. The experimental methods employed by the authors are described in detail. *Bull* 1947 \ 40 826-827 1946 \ 43 82

per kilogram f

before infection. The results obtained by both methods are recorded for

parasitemia. From these experiments it emerged that the best results are not obtained by drug-diet therapy with all drugs but that depending on the compound used the results from a single daily dose may equal exceed or prove inferior to those of drug-diet therapy. *J D Fulton*

MARSHALL E. H. JR & DEARBORN E. H. The Relation of the Plasma Concentration of Quinacrine to its Antimalarial Activity. *J Pharm & Exper Therap* 1946 Oct \ 88 No 2 142-53 1 fig {12 refs}

According to the authors satisfactory proof has not yet been given that the antimalarial activity of quinacrine (atebrin mepacrine) is related to the variations in plasma concentrations in persons receiving the same daily dosage

are not correlated with antimalarial activity. White Pekin ducks of weight 200 to 3000 gm were used and infected according to the technique described by the authors [*this Bulletin* 1943 \ 40 223 1946 \ 43 826]. The drug was generally given by stomach tube in a volume of 10 cc per kilogram body weight except in one experiment where the drug-diet method was used. Duplicate analyses for quinacrine were made on blood samples obtained from the right jugular vein and tissues were homogenized in dilute HCl before analysis by the method of BRODIE & UDENFRIEND [*this Bulletin* 1944 \ 41 453]. Great variations were found in plasma concentration in individual birds receiving the same dose of drug and from experimental evidence with single or repeated doses of 75 or 5 mgm per kilogram were believed to be due to differences in distribution between plasma and tissues including erythrocytes. The variation in concentration was less in the case of tissues and was not related to that in plasma. Quinacrine was found to be localized in cells parasitized with *P. lophurae* in this case also the amounts present were not correlated with levels in plasma and therapeutic effect appeared rather to vary directly with dosage. The rate of disappearance of the drug from plasma and tissues was determined 14 and 28 days respectively after a single dose of 75 mgm per kilogram and was found to be greatest from plasma and least from liver. The authors believe that their findings in the duck are also applicable to man. *J D Fulton*

TRYPANOSOMIASIS.

VEATCH, E. P., BEQUAERT, J. C. & WEINMAN, D. Human Trypanosomiasis and Tssetse-Flies in Liberia. *Suppl. to Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 105 pp.

Part I. Human trypanosomiasis in Liberia 1941-1944.

By EVERETT P. VEATCH, M.D.

The first authentic record of trypanosomiasis in Liberia was by THEILER in 1926, who found five cases, following which sporadic cases were noted. The disease is said to have been introduced into Liberia by labourers returning from Fernando Po after the war of 1914-18, but since there is a word for sleeping sickness in most native languages it was probably endemic at a low incidence until the growth of the rubber industry broke down tribal barriers. The development of roads and the stopping of inter-tribal warfare facilitated an alarming increase.

Population distribution in Liberia is greatest along the coast and the French border; between these two areas are stretches where few people live, much of it virgin forest.

In 1941-43 the author investigated the incidence of sleeping sickness in the Western Province of Liberia by a mass campaign. During this period 90,980 persons were examined and 13,481 cases diagnosed. Of these, 67 per cent. received more than six treatments and 33 per cent. less than six. The tribe mainly affected was the Kissi who move freely to visit their fellow-tribesmen in affected areas of Sierra Leone and French Guinea, the tribe being divided almost equally in the three territories. Thirty-one towns located in all parts of the Western Provinces were surveyed.

In 1943, the American Foundation for Tropical Medicine sent Drs. Bequaert and Veatch to do a four-months' survey in North-West Liberia. During this period Dr. Veatch examined 32,617 persons, and found infected a total of 718 cases, or 2.2 per cent. of the population examined. Much of the area covered by this survey had previously been dealt with in the survey and treatment campaign of 1941-43. Details are given of the route covered and the incidence of the disease in the various tribes investigated. (The itinerary is very difficult to follow owing to the absence of a map of Liberia.)

The Kissi showed an incidence of 2.5 per cent. among 1,479 examined. This tribe was examined thoroughly twice during 1941 and 1942, and 26 per cent. had been shown infected. In this new survey, 4 per cent. of the previous Kissi cases were found to have relapsed. The high incidence of infection in this tribe is believed to be due to their cultivation of swamp rice; their migratory habits in visiting their fellow-tribesmen in Sierra Leone and French Guinea; the fact that their towns are small and closely surrounded by vegetation, and possibly the fact that they keep hogs.

It is concluded that trypanosomiasis was present over a wide area in the Western Province, was patchy in distribution and constituted a problem of public health importance.

the age-group 20-40, probably the result of more frequent exposure to infection. Only 6 per cent. of the cases showed clinically involvement of the central nervous system, 1 per cent. being in the terminal stage, so that a vast majority were in an early stage of the infection. A careful analysis is recorded of the incidence of symptoms and signs, duration of illness from onset, of alteration in cerebrospinal fluid proteins (55 per cent. normal) and cells.

Originally in January 1943 the patient an African woman had trypanosomes in the blood and gland juice. After treatment with Orsanine and Atoxyl,

gland juice. Clinically apart from evidence of sleeping sickness she had a moderate ascites. Two or three trypanosomes per field were found in fresh and stained preparations of the ascitic fluid. The stools contained many ankylostome eggs.

The author discusses the possible causes and mechanism of the appearance of the trypanosomes in the ascitic fluid and considers that this is related to the trypanosomiasis and especially to the persistence of the parasite in the lymphatic system that it is veritably a trypanosome seritis rather than a passive mechanical accumulation. The patient was already in a bad condition and despite treatment for the relief of the ascites and other complications she died in October 1945.

The author saw a similar case in 1943 but possesses insufficient details to warrant a report. He believes that the phenomenon is rare and is aware of only one other case in the literature [*CHOLMARA Revue des Sciences Médicales Pharmaceutiques et Vétérinaires de l'Afrique Française Libre* Brazzaville]. Full clinical details of the patient's condition and treatment are given but the point

afterwards. The trypanosomes could be found without centrifugation and survived with active movement in the fluid *in vitro* at laboratory temperature for more than four days. One *M. barcrofti* was found in a fresh preparation of the fluid and it was suggested that in this case the transference of the trypanosomes to the ascitic fluid was a secondary phenomenon.]

H. J. O. D. Burke Gaffney

MUNIZ J. & DE FREITAS G. Estudo sobre o determinismo da transformação das formas sangüíneas do *Schizotrypanum cruzi* em crithídias. I. Da existência de um fator responsável por essa metamorfose [Attempts to discover the Factor necessary for transforming Blood Forms of *T. cruzi* into Crithidia]. *Rev. Brasileira Med.* Rio de Janeiro 1945 Dec. 12 No. 12 995-9. English summary.

The authors macerated the blood washed free of all fresh RBCs. The transformation occurs does not take place. It became evident that some constituent of the blood is necessary for the transformation. Experiments showed that this constituent is in the red blood corpuscles which are effective when completely

the missing factor. Nutrient broth, meat infusion and peptone were effective. A blood extract prepared by heating equal parts of blood and physiological saline for 20 minutes at 120° C. was also active when employed alone or when added to the liquid from N.N.N. medium. The extract gave a strongly positive peroxidase reaction. It would appear that the X factor is necessary, but only in part, as the liquid of N.N.N. medium contains abundant haemoglobin. Meat infusion, nutrient broth and peptone will not alone determine the transformation, owing to lack of X factor. Further investigations are being carried out to determine the nature of the active substance. C. M. Wenyon.

SEIJAS RIVAS, J. V. Contribución al estudio de la enfermedad de Chagas, en el Estado Carabobo. [Chagas's Disease in the State of Carabobo.] *Bol. de los Hospitales*. Caracas. 1946, Mar.-June, v. 45, Nos. 2/3, 61-93, 13 figs. [35 refs.]

This account of field investigations into Chagas's disease, carried out during a period of 3½ years, was presented by the author as his thesis for the Doctorate of Medicine. The inhabitants of the area studied lived in small hamlets, in rush and palm-thatched huts, dilapidated in many cases, sharing their quarters with domestic animals, living, in short, in squalor and poverty. Their food comprised mainly kidney beans, plantains, yams and the like.

The chief vectors of tion, half or even more, geniculatus, also infect the last was found infected. Opossums and armadillos were proved to be reservoir hosts.

Diagnosis of cases was made by the clinical condition and confirmed by direct examination of the blood (thick drop) and by xenodiagnostic methods. Nine cases are described in detail (10 are referred to), all in children whose ages ranged from 2½ months to 16 years. They were all typical. [No figures are given by which one can calculate the actual prevalence of the disease. The illustrations are very foggy and poorly reproduced.]

H. Harold Scott.

LEISHMANIASIS.

FELDMAN, A. Kala-Azar with Onset of Symptoms in Great Britain. *Brit. Med. J.* 1946, Nov. 30, 816-17.

The object of this paper in which is described a typical case of kala azar is to call attention to the recognition of this disease in English soldiers returning from the Mediterranean littoral. In this case the patient was a soldier who had served in North Africa and Italy for 3½ years, returned to England in good health and remained so for four months. The incubation period should be noted and it was probably considerably longer than suggested. The diagnosis was made by sternal puncture and treatment successfully conducted by 21 intramuscular injections of anthiomaline. P. Manson-Bahr.

PARRINELLO, G. Contributo allo studio della diatesi emorragica nella Leishmaniosi infantile. [The Haemorrhagic Condition in Infantile Kala Azar.] *Pediatria*. 1946, July-Sept., v. 54, Nos. 7/9, 432-44. [21 refs.] English summary (9 lines).

It is well known that certain cases of kala azar are specially liable to haemorrhages. From this point of view the author has examined 21 cases of

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in the flies. Furthermore the insects were evidently wild ones but infection of four with *Leishmania tropica* before the experiments is hardly probable in view of the rarity of cases of oriental sore in the district. It is perhaps remarkable that the incubation period should have been as short as two weeks in all four cases. It is not possible from the microphotographs to recognize leishmania in the infected insects which the author does not definitely identify with those which are supposed to have transmitted the infection.]

C M Henyon

PESSÔA S B & BARRETTO V P Tipos de exploração do solo como fator de incidencia da leishmaniose tegumentar Americana [The Soil as a Factor in the Causation of American Cutaneous Leishmaniasis] *Brasil Medico* 1946 Sept 21 & 28 v 60 Nos 38'39 305-9 [19 refs]

This contribution is a general summary of the evidence that workers employed in forestry and wood industries as in making railway sleepers chicleiros (gatherers of chicle gum) etc are those most prone to infection. The synonyms of this disease—forest vau, boch vau, pian bois—are evidence of the connexion recognized to exist. The men build log huts where they work and these allow swarms of *Phlebotomus* to enter. The authors quote abundantly from the literature in support of their statements.

H Harold Scott

ROMANA C CONEJOS V & LIZONDO J E Foco de leishmaniosis tegumentar en Tucuman A Focus of Cutaneous Leishmaniasis in Tucumán [An Inst Med Regional Tucuman Argentine 1946 Aug v 1 No 3 239-87 25 figs & 1 map Summary in English by the author]

The authors report the finding of a focus of cutaneous leishmaniasis in the Department of Burruvaco (Tucuman). Twenty-one cases are reported the majority of them children from 7 to 14 years old. From a clinical point of view the lesions were similar an ulcerous form with a great tendency to a spontaneous cure. Generally the mucous membranes of the mouth and nose remain healthy.

The histologic study of the biopsies revealed the well known leishmaniasis histo-pathology the authors stressing the frequent finding of 'mastzellen' in the interior of the cellular infiltration.

The patients were treated with *Fuadine Urea-Stibamine tartar emetic* and *Repodral*. In the area *Ph migonae* and *cortele* have been identified.

FEVERS OF THE TYPHUS GROUP

On some Anomalous Weil-Felix Reactions

Note by Sir John W D MEGAW Sectional Editor

Some readers of this *Bulletin* have doubtless been puzzled by anomalous responses to the Weil-Felix test which have been reported from time to time. Dr A FELIX in a personal communication has made important comments on some of these and has now kindly agreed to the publication of the substance of his remarks. Special reference was made to two papers one by VAN ROOYEN [see this *Bulletin* 1945 v 42 194 in which a number of cases are discussed in which the reaction was of the *Proteus* O12 type although there was no suspicion of tick borne typhus the other was by DICK see this *Bulletin* 1946 v 43 726] who reported several different kinds of anomalous react-

including :—"relatively common" non-specific OXK reactions at titres of
 1
 1
 1

"Standard R.A.M.C. Suspensions of the *Proteus* OX Strains" during 1941-1943 in the Middle East have not been of very good quality owing to their having had to travel across or round Africa, and that many batches were therefore useless on arrival. He also states that the OXK suspensions were the first to deteriorate, next came OX2, while OX19 was relatively stable.

These comments, from so authoritative a source, deserve the widest publicity; they also raise the question of the great need for standardization of the materials and methods employed in the Weil-Felix test, which is often the only available

confidence for making suspensions.

The matter is of such importance that it deserves study by an international committee constituted on the lines of the Biological Standardization Committee of the Health Organization of the League of Nations.

BOL. OFICINA SANITARIA PANAMERICANA. 1946, May, v. 25, No. 5, 385-7. [English summary 393.] Primera Reunión Interamericana del Tifo. [First Inter-American Meeting on Typhus.]

"The First Inter-American Meeting on Typhus was held in Mexico, October 7-13, 1945, under the auspices of the Mexican Government and with the co-operation of the Pan American Sanitary Bureau and the Institute of Inter-American Affairs. Delegates from Colombia, Cuba, Chile, Guatemala, Mexico and the United States attended. Recommendations were made on better reporting of the disease and the initiation of better control measures based on the use of vaccines and DDT. It was also recommended that surveys be intensified in order to increase our knowledge of the clinical types of rickettsias present in the different regions of the Americas. Prevention, diagnosis, treatment, and epidemiological aspects of the disease, especially means of transmission and maintenance of the virus in nature, were given special attention and recommendations made."

MONTOYA, J. A. Datos sobre la distribución e incidencia de las rickettsias en las Américas (Comisión Panamericana del Tifo). Septiembre de 1945. [Data on Distribution and Incidence of Rickettsias in the Americas.] Bol. Oficina Sanitaria Panamericana. 1946, May, v. 25, No. 5, 394-9, 1 map. [English summary, 402.]

TOVARNICKIJ, V. I., KRONTOVSKAJA, M. K. & CEBURKINA, N. V. Chemical Composition of *Rickettsia prowazeki*. [Correspondence.] Nature. 1946, Dec. 21, 912.

POTOP, I. & BALS, M. La polypeptidémie dans le typhus exanthématique. [Polypeptide Levels in Exanthematic Typhus.] Bull. Acad. Med. Roumanie. 1945, v. 17, Nos. 1/3, 216-20.

The following is a translation of the authors' summary.

It is noted in general that in exanthematic typhus, polypeptides and urea are increased and the alkaline reserve and chlorine are diminished.

The toxic syndrome of exanthematic typhus is not due to a single factor and we have observed that no constant single factor exists in relation to the gravity of the condition. It should, however, be noted that in every case and

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especially in serious fatal cases there are important variations sometimes due to one factor, sometimes to another and sometimes to all the factors together, which undoubtedly contribute between them to the lack of equilibrium in the humoral fluids

H J O D Burke Gaffney

BENGTSON Ida A Serological Relationships in the Epidemic-Endemic Typhus Group as determined by Complement Fixation. *Pub Health Rep Wash* 1946, Sept 20 v 61 No 38 1379-85

The author describes a further and more extensive investigation into the complement fixing properties of sera of guinea-pigs convalescent from attacks of epidemic and endemic typhus fever. Three strains of endemic and sixteen of epidemic rickettsiae were studied the former were the Wilmington strain isolated from a patient by Mancy in 1928 and two strains isolated from rats in the USA, the latter originate from Prague (the Breinl strain) Madrid Barcelona Colombia Egypt, Tcheran and Algiers.

The antigens were prepared from yolk sac cultures by a modification of Craigie's ether method the immune sera were obtained from guinea-pigs two to three weeks after recovery from febrile attacks occurring in the course of the maintenance of the various strains.

All the epidemic antigens were titrated against a Breinl strain of immune serum, for the titration of the endemic antigens the Wilmington strain of serum was used.

Various strains of epidemic and endemic immune sera were tested against fixed amounts of antigen of different strains. From the detailed results shown in tabular form it appears that there was a remarkable degree of uniformity in the complement fixation titres of the different strains of epidemic immune sera, and a similar uniformity among the titres of the endemic sera. For example, the Breinl and two other epidemic sera all gave titres of 1-128 when tested against seven different strains of epidemic antigens and the same sera tested against endemic antigen strains gave titres of 1-32 against two and nearly 1-64 against the third.

Two endemic sera were tested in the same way against endemic and epidemic antigens with the endemic antigens the titres ranged from 1-128 to 1-256, with epidemic antigens the range was 1-32 to 1-128 but in each individual test the titre with the homologous antigen was two to three times higher than with the heterologous.

The conclusion reached was that although epidemic and endemic typhus fever possess an antigenic factor common to both the diseases can be differentiated by the uniform occurrence of a higher titre complement fixation reaction against the homologous antigen than against the heterologous.

[This conclusion is doubtless justified when the tests are carried out by workers with exceptionally high standards of technical skill experience, and laboratory facilities such as were at the service of the author but the potential margin of error seems too small to compensate for any shortcomings in these respects.]

John H D Megaw

CODELEONCINI E Studi e ricerche su uno speciale virus tifico d'origine umana isolato in Etiopia. Investigation of a Special Type of Typhus Rickettsia of Human Origin, Isolated in Ethiopia. *Bol Soc Ital di Med e Igiene Trop* (Sez Eritrea) 1946 v 6 Nos 1/2 107-27 [24 refs] English summary (4 lines)

A strain of typhus rickettsia isolated in Addis Ababa is claimed to be the first in Ethiopia that has been clearly proved to be murine

The strain was consistently orchitic; it was maintained through 72 consecutive passages in guineapigs.

Among 200 clean lice fed on the patient on the 5th day of his illness 4 per cent. became infected. By intrarectal inoculation from louse to louse, the infection rate rose to 100 per cent. and the fatality rate for lice, which at first was 20 per cent., rose to 55 per cent.

Numerous animal inoculations were carried out. In successive passages the strain became progressively more virulent for guineapigs and lice, but less virulent for rats, so that there was a tendency to the development of the characteristics of the classical type of infection.

John W. D. Megaw.

DAVIS, D. E. & POLLARD, M. The Distribution of Murine Typhus in Rats and in Humans in San Antonio. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 619-24, 1 fig.

In a survey of murine typhus among rats and human beings it was found that there was a general, but not detailed, correlation between the number of cases in human beings and the percentage of rats found infected by complement fixation tests. Human infection seemed to depend on local concentrations of infected rats rather than on uniform distribution of infection among the rats of the whole area.

In "fairly good residential areas" about 40 per cent. of the rats were infected; in slum areas the infection rate was 60 per cent.

John W. D. Megaw.

POLLARD, M., DAVIS, D. E. & OLSON, T. A. The Serological Detection of Murine Typhus in Flea Feces. *Amer. J. Hyg.* 1946, Sept., v. 44, No. 2, 244-8, 1 fig.

The authors describe a new test for detecting murine-typhus infection in rat fleas. They find that suspensions of infected flea faeces contain a specific antigen whose presence can be shown by the occurrence of positive complement-fixation reactions when the suspensions are tested against a homologous immune serum. The specificity of the test is shown by the fact that negative reactions always occurred when suspensions known to contain the antigen were tested against immune sera of tick typhus, mite typhus, and Q fever.

The test is claimed to be more rapid and less costly than the inoculation of animals with flea suspensions, and also to be more reliable than the commonly-used complement-fixation test of rat serum, because this shows only the presence of immune bodies, which persist after the animal has ceased to be infective.

Details of the technique will be found in the paper. The procedure in outline consists in placing 10 or more undamaged fleas from one or two freshly-killed rats in a test tube, which is kept overnight in the vertical position at room temperature. The suspension is made by mixing 0.6 cc. of normal saline with the faecal deposit in the tube.

Positive results were obtained with 13 out of 17 suspensions each of which was made from a pool of fleas collected from an experimentally-infected rat.

Control suspensions, from fleas of 22 non-infected rats, gave 20 negative results; the remaining two were anticomplementary.

Flea-faeces suspensions originating from 30 serum-positive trapped rats yielded 14 positive, 11 negative, and 5 anticomplementary, results.

Suspensions from 53 serum-negative trapped rats gave 51 negative, and 2 positive, results.

John W. D. Megaw.

[March, 1946]

RUIZ SANCHEZ, F., PONCE DE LEON, Estela & OROZCO, G. La frecuencia del tifo en Guadalajara [The Frequency of Typhus in Guadalajara] *Medicina* Mexico 1946 Oct 25 v 26 No 318 440-42

Typhus is common in Guadalajara, Mexico. The predominant variety is a benign endemic murine form having widely varying clinical manifestations. The authors set out to discover the incidence of *Proteus OX19* agglutinins in persons without clinical evidence of the disease. They carried out Welch's modification of the classical Weil-Felix reaction on 705 specimens of blood from afebrile persons. Amongst these 114, or 16.2 per cent, were positive. Titres of 1/30 or over were observed in 78 cases. The authors conclude that rickettsial infection is frequent in Guadalajara, but is not always recognized.

BENGTSON, Ida A. Separation of the Complement-Fixing Agent from Suspensions of Yolk Sac of Chick Embryo Infected with the Karp Strain of Tsutsugamushi Disease (Scrub Typhus). *Pub Health Rep Wash* 1946, Sept 27, v 61 No 39 1403-8

It has been reported previously that a complement fixing antigen is present in yolk-sacs infected with the Karp strain of scrub typhus rickettsiae. The paper describes the technical details of a method whereby an almost waste clear fluid containing the greater part of the antigenic fraction can be obtained. The methods used included ether treatment, differential centrifugation and iso-electric precipitation of yolk sac suspensions. A. J. Rhodes

GIROUD, P. Pour voir pathogène des corps homogènes formés par les agents étiologiques de la fièvre fluviale (The Pathogenesis of the Cause of the Cause). *Path Exo*

The author's work on the relationship between the morphological appearance and pathogenic properties of two strains of rickettsiae as in his earlier work on other typhus rickettsiae. The morphological investigation was carried out chiefly on smears from the peritoneal exudate of infected mice. The smears were fixed treated with acetone, and stained with Giemsa R 4 L which was freshly diluted with boiling water. The rickettsiae as usual were polymorphic. They sometimes occurred in clusters both in the protoplasm and nuclei of the invaded cells. Strains kept for 15 days at -25°C showed a loss of virulence. They no longer killed the mice but still caused great enlargement of the spleen and a peritoneal exudate in which there were large mononuclear cells with vacuolated protoplasm and nuclei but no rickettsiae could be seen. After further passage through mice the strain regained its virulence. Intracutaneous injections of the strain into rabbits caused local reactions which were proportional to the degree of concentration of the rickettsiae. Strains inoculated intranasally into rabbits caused bronchopneumonia, but rickettsiae were found only in the form of homogeneous bodies of 2-3µ in diameter and of a prussian blue colour when stained with Giemsa. Maternal containing these bodies when inoculated into mice caused an attenuated reaction, but after a second passage through mice typical reactions were obtained.

"The evolution—rickettsia bodies to homogeneous rickettsiae" is thus regarded by the author as being obtainable by the simple method of passage from mouse to rabbit and *vice versa*.

John W. D. Megaw.

PHILIP, C. B. & WOODWARD, T. E. Tsutsugamushi Disease (Scrub or Mite-borne Typhus) in the Philippine Islands during American Reoccupation in 1944-45. II. Observations on Trombiculid Mites. *J. Parasitology*. 1946, Oct., v. 32, No. 5, 502-13, 6 figs. [20 refs.]

The authors present facts on the systematics and biology of *Trombicula* and related mites in the Philippine Islands. Larvae of *T. akamushi* and *deliensis* both attack man, as does *T. wichmanni*, and possibly one or two others. "Scrub Itch" does not occur in these islands.

It is generally accepted that larvae of *akamushi* and *deliensis* are very similar: the generally accepted criterion is that in the first the dorsal setae are more than 30, and that there are 8 setae in two (or even three) of the rows: in *deliensis* there are generally 28, and they reach 8 in only one row (the second). The authors find both types, and a very large number of others occur. A considerable proportion of specimens are asymmetrical, having 7 or 9 setae in a row in place of an even number. The authors do not analyse their biometrical data very far; probably wisely, for until other instars of *akamushi* and *deliensis* are available it seems unwise to concentrate on chaetotaxy of larvae which cannot be identified with certainty. One notices that both types of larvae occur on a number of sorts of *Rattus*, also on shrews.

The authors did not spend long in the Philippines and regard it as probable that many more *Trombiculinae* remain to be discovered. They give a key, which includes the larvae known to occur or most likely to be discovered.

P. A. Buxton.

SAYEN, J. J., POND, H. S., FORRESTER, J. S. & WOOD, F. C. Scrub Typhus in Assam and Burma. A Clinical Study of 616 Cases. *Medicine*. 1946, May, v. 25, No. 2, 155-214, 27 figs.

In this well-illustrated paper of 60 pages the authors give an exceptionally clear and comprehensive account of the clinical aspects of scrub typhus in Assam and Burma, from November 1943 to February 1945.

The study is based on observation of 616 patients, of whom 81 were Chinese and the rest Americans.

A statistical analysis deals with 200 consecutive American cases seen between

of fatality rates among different groups of patients—0 to 16 per cent.

From the wealth of valuable information contained in the paper only a few items can be mentioned.

During the first week of the illness it was not usually possible to tell whether the attack would be severe or mild: the severe and fatal attacks (33) differed little from the mild and moderate (67) at this stage. Death occurred most frequently in the early part of the third week, and often happened a few hours after the onset of convulsions, pulmonary oedema, or severe cyanosis. At autopsy the usual widespread pathological changes were found, but gross tissue destruction was rarely seen.

The intraocular findings during life included:—engorgement of the retinal veins (67); oedema of the retina and disc (36); and retinal haemorrhage (6·6).

The primary lesion (60) had seldom been noticed by the patient, and often had to be carefully looked for. The rash (71) was usually maculopapular, it involved the trunk in all cases, often also the limbs but never the palms or soles.

The fever was usually of an irregular spiking type with a double daily rise at some stage of the illness. No relapses occurred.

The spleen was often palpable (35) and sometimes was also tender (7.5). The haemoglobin fell to some extent during the first two weeks, occasionally by 25 per cent. The leucocyte count was very variable; a moderate increase in the polymorphonuclears and lymphocytes was usual.

An OAK titre of 1-100 was regarded as diagnostic because this titre was not observed in any other condition but it was reached in only about half of the cases. OAL and OAL9 titres up to 1-50 at most were not infrequent early in the illness.

were —(a) history of exposure to
ing lymphadenopathy (97) but this
e rash (c) the intraocular signs,
(f) an OAK titre of 1-100 or over and (g) exclusion of cerebral malaria,
pneumonia meningitis typhoid fever plague and sepsis.

It was believed that some degree of pulmonary involvement was usually present; pronounced tachypnoea and severe cyanosis indicated severe and dangerous pneumonitis which might not be revealed by X ray examination.

In severe attacks cardiac enlargement with gallop rhythm was common but not more so in fatal cases than in severe attacks followed by recovery. The only electrocardiographic finding regarded as indicating myocarditis was a sharp T wave inversion or notching which was found in 11 per cent of 61 acutely ill patients but surprisingly none of the patients who had this condition died whereas there were three deaths among the other patients whose curves had been found free from the abnormality shortly before death. It appeared, therefore, that no prediction could be made of impending cardiac disaster.

Among the numerous disturbances referable to the nervous system were —

Albuminuria was usual when pronounced (24) it was commonly associated with the presence of brown yellow granular casts. A few red blood cells were

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The most ominous phenomena were as follows (the first figure in each case shows the number of patients who died afterwards the second figure refers to the number of patients affected) —convulsions 11-12 Cheyne-Stokes breathing 12-14 hiccough 5-8 temperature 105°F on five days 13-24, malignant restlessness 13-26 tachypnoea (36 per minute for seven days) 10-22, tachycardia (over 130 per minute) 12-27 and cyanosis 14-36.

Important complications during the two weeks following defervescence were —severe intestinal haemorrhage in one case, thrombophlebitis sometimes

occurred, and in three cases it was followed by pulmonary embolism; post-typhus pleurisy occurred in 10 per cent. of the cases; all the patients affected by these complications recovered.

The cardiac condition of 25 unselected patients was studied in late convalescence. No patients who

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to the patient;
No hesitation
was felt in giving 5 per cent. glucose by the vein in the rare cases in which it was considered necessary; blood transfusions were also given in accordance with the usual indications. Digitalis or other drugs to combat myocardial damage was never found necessary. Penicillin and convalescent serum were tried but no benefit was observed from either.

An air-conditioned hospital was installed in June 1944; it added greatly to the comfort of the patients and attendants.

After experience had been gained by "trial and error" the last 300 of the surviving American patients were finally disposed of as follows:—82 per cent. were returned to full duty within three to four months; the rest were invalided, mostly because of the severity of the attacks, but a few who had been classed as "mild or moderate" were invalided for reasons other than scrub typhus.

John W. D. Megaw.

STEINITZ, H. A Case of Tick Borne Fever (*Flèvre Boutonneuse*) in Palestine. *Harefuah*. Jerusalem. 1946, Dec. 1, v. 31, No. 11. [In Hebrew 189-90, 1 fig. English summary 190-91.]

This is stated to be the first case of this disease known to be published in Palestine.

CODELEONCINI, E. Sulla presenza in Etiopia della "*Rickettsia Weigli*" Considerazioni sul rapporto fra la *Rickettsia Weigli*, l'agente eziologico della "Febbre delle Trincee" e la *Rickettsia pediculi*. [The Occurrence in Ethiopia of "*Rickettsia weigli*" the *Rickettsia* of Trench Fever.] *Bol. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1946, v. 6, Nos. 1/2, 129-51. English summary (9 lines).

A laboratory outbreak of trench fever occurred at the Addis Ababa Rickettsiosis Laboratory. All the seven persons affected were attacked while they were employed in supplying blood meals for thousands of lice which were being reared for the purpose of preparing the Weigl type of vaccine. The first case occurred on the 25th October, 1941, about eight days after it had been discovered that some lots of "clean" lice were harbouring rickettsiae; the last case appears to have occurred some time in December.

The clinical features in each case were typical of trench fever; 6 or 7 short paroxysms of fever recurred at an average interval of 4-5 days. The nature of the infection was demonstrated by intraperitoneal inoculation of two monkeys with the intestines of 40 lice taken from batches found infected by rickettsiae. The monkeys developed typical recurrent febrile attacks, and a third monkey reacted to inoculation with blood from one of them.

Guinea-pigs inoculated intraperitoneally with infected lice or sera from patients developed irregular febrile attacks but rickettsiae were not found in peritoneal scrapings.

Rickettsia-agglutination tests were carried out on the patients, with organisms obtained from infected lice; the titres observed ranged from 1-20 to 1-320.

As a result of extensive laboratory investigation of the strain the author concluded that it was identical with *Rickettsia quintana*, otherwise known as

BATES M & ROCA GARCÍA M Experiments with various Colombian Marsupials and Primates in Laboratory Cycles of Yellow Fever *Amer J Trop Med* 1946 July v 26 No 4 437-53 4 figs & 2 diagrams [27 refs]

The extensive field studies of sylvatic yellow fever that have been carried out in Brazil and Colombia all indicate the virus is maintained in nature by constant mammal mosquito passage and that in many areas at least the vector mosquito is *Haemagogus capricornis* or closely related species. The authors have previously shown [this Bulletin 1946 v 43 32] that in the laboratory this mosquito requires rather special conditions for infection and

carried out by the authors in Colombia on local mammals local mosquitoes and local virus

Only one of 11 attempts to infect *Haemagogus* on the brown masked opossum (*Metastelurus*) was successful though 11 of 13 animals bitten by infected *Haemagogus* showed circulating virus. The woolly opossum (*Caluromys*) was much less susceptible. The authors consider these to be the two most susceptible of Colombian marsupials and it thus seems doubtful whether any of the local m.

sa Attempts to infect the widow monkey (*Callicebus*) gave irregular results and the local capuchin (*Cebus fariellus*) in four experiments failed to circulate enough virus to infect haemagogus mosquitoes. Cebus monkeys in Villa vicencio area frequently show positive sera and the authors think these may represent a dead-end in natural virus cycle.

Transmission may be shorter in nature than in the laboratory so that one may expect that explosive regions where to build up to as long months behind actual epizootic spread of virus. Virus is circulated in the monkeys 7-8 days at most but in mosquitoes for life so that spread is more likely a function of mosquitoes than of mammals. F O MacCallum

LAUTERBURG BONJOUR M Ueber Gelbfieberschutzimpfungen [The Prevention of Yellow Fever] *Schweiz med Woch* 1946 Nov 23 v 76 No 47 1206-10 [71 refs]

A review of work on yellow fever prophylaxis

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ELSDON DEW R with the technical assistance of R HORNER & D A CAMERON Some Aspects of Amoebiasis in Africans *South African Med J* 1946 Oct 12 & 26 v 20 Nos 19 & 20 580-87 670-26 12 charts [198 refs]

As a preliminary the first three pages of this paper consist of a survey of a formidable number of papers [chiefly American] on the discovery and nomenclature of *Entamoeba histolytica* its relation to amoebic dysentery the probable

modes of its dissemination and entry into the individual, and the types and site of the intestinal lesions it may give rise to in man and in experimental animals. Embolic infection of the liver is stated, in general, to be comparatively common, with the liver more often than not winning the battle between the cytolytic activities of the parasite and the reparative activity of the host; in support of this view is adduced as evidence "the heavy fibrous capsule found in even the largest of abscesses" [this is a most unusual finding]. The literature on the strains of *E. histolytica* and on the possible multiplicity of species is summarized, as is that on the differing susceptibilities of natural and experimental hosts. The effect of diet and of concurrent bacterial infections on the intestinal infection is reviewed, and the rarer involvement of tissues elsewhere in the body is also dealt with. The difficulties in detecting the presence of the parasite are mentioned, and its geographical distribution is not neglected.

The more immediate purpose of the paper is to record the gravity of the problem of amoebiasis in the African in Natal and more particularly in Durban, and to this end data are given on this disease as encountered in the King Edward VIII Hospital, Durban, a 1,200-bed hospital which admitted totals of 33,018 and 34,284 patients in 1944 and in 1945 respectively. Stools from patients giving some clinical indication of dysentery were there examined as fresh film preparations; the examinations were made on three consecutive days, and it is estimated that between 65 and 70 per cent. of infections were detected by this means. Most persons harbouring *E. histolytica* were found to be passing amoebae, which were readily detected; cysts were more difficult to find, owing to the irregularity in their passage, and also in their distribution in the specimens. Faust's zinc sulphate concentration technique for cysts was adopted in the examination of over 1,000 specimens, and in a chart and a table the results obtained by direct examination and by the concentration technique are compared, the advantage lying with the latter. In further charts and tables are displayed the results of the examination for protozoa and helminths of 20,243 stools from Africans and 1,838 from Indians, and also the case-incidence of the various protozoa and helminth infestations detected in 4,852 Africans and 500 Indians. From these it can be seen that from 32.83 per cent. of the Africans and 38.00 per cent. of the Indians no parasites at all were recovered; that 27.51 per cent. of the Africans and 9.00 per cent. of the Indians harboured *E. histolytica*; and that most of the protozoal and helminth parasites commonly found in the stools of those living in the tropics were well represented, *Ascaris* being the most common (Africans 37.55 per cent., Indians 38.20 per cent.). In Indians *E. histolytica* gives rise to a chronic somewhat indefinite syndrome, akin to that found locally in Europeans, while in the African the disease is an acute fulminating one with severe diarrhoea and the passage of blood, mucus and pus containing very large numbers of amoebae; in these Africans the mortality is high. On culture, no specific concomitant infection with pathogenic bacteria was found to account for the severe

Africans the main incidence of the acute disease was in the lower income groups, the better fed domestic servants being much less affected. In the native staff of the hospital acute amoebic dysentery is almost unknown, though chronic amoebiasis occurs. A spot map of the distribution of cases in Durban shows the greatest number of cases to occur in the Mayville district, which consists largely of shacks unsupplied by the essential services, water being obtained from communal standpipes or, when there is water in them, from local streams.

The population of Mavville is a mixed African and Indian one. In the Lamont Village area where the population is purely African acute amoebiasis was rare. Other areas with a predominantly Indian population also had a low incidence of the disease—which suggests that a mixture of a susceptible [African] population with a non susceptible carrier [Indian] population has some bearing on the high incidence in Mavville. Cases drawn from surrounding districts in Natal outside Durban show that acute amoebiasis occurs in all areas.

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lowering of the protein factors. While cases of amoebic dysentery were all more or less deficient in protein, some cases of non amoebic dysentery had protein levels in the higher range of normality. That both Africans and Indians are similarly exposed to faecal contamination of food is indicated by the comparable incidence of such helminths as *Ascaris* and *Trichuris* but a difference in their diet is indicated by the relative absence of *Taenia* infection in the Indians. That the diet of the African is deficient substantially consisting as it does of maize is well known and severe amoebiasis is known to be associated with a maize diet. Climate plays a part in the ease of transmission of the parasite and the severity of the disease resulting from its presence. From tables and charts it is shown that there is a demonstrable periodicity in the incidence of the disease which attains its maximum in March and minimum in August following with a lag the maxima and minima for temperature and rainfall.

The mortality of the disease as shown by tables was extraordinarily high (10.7 per cent for all cases [? African]) despite early institutional treatment and a common cause of death was perforation. Attempted treatment with high enemata of raw liver had to be abandoned owing to the shock caused.

A. R. D. Adams

AYADI M. S. & EL KORDY M. I. Cultivation of *Entamoeba histolytica* in Tomato Juice. *J. Roy. Egyptian Med. Ass.* 1946 July-Aug. v. 29 Nos. 7/8 214-18.

HALAWANI A. & EL KORDY M. Cultivation of *Entamoeba histolytica* in Hydatid Scoleces Extract. *J. Roy. Egyptian Med. Ass.* 1946 July-Aug. v. 29 Nos. 7/8 211-13.

1. A new fluid medium (made from an extract of dried hydatid scoleces in Ringer's solution) for the cultivation of *E. histolytica* is described in the text.

2. This scoleces medium has proved very efficacious for the cultivation of *E. histolytica* and for its maintenance in subcultures.

BOUROVA, L. F. Étude expérimentale des amibes du type *histolytica* chez les singes inférieurs. [Experimental Study of *histolytica*-like Amoebae in Monkeys.] *Ann. Parasit. Humaine et Comparée*. 1946, v. 21, Nos. 3/4, 97-118, 7 figs.

Working in the monkey park at Soukhoum in the Caucasus the author has found that certain monkeys harbour amoebae of the *Entamoeba histolytica* type and that the feeding of cysts in milk to kittens frequently results in amoebic infections which in many cases are of the dysenteric type. Among 18 attempts to infect kittens with the amoebae from a *Cynocephalus hamadrias* 8 were successful; of 11 attempts to infect with the amoebae of a *C. anubis* 5 were successful, while of 25 attempts with amoebae from three *Macacus nemestrinus*, 10 were successful. Amoebae from two other *C. hamadrias* failed to infect kittens in 9 attempts. In one of the infections produced by amoebae from *C. hamadrias* only small amoebae 5 to 3 μ in diameter were found. Yet when this strain was passed to another kitten, presumably by rectal inoculation, an acute amoebic dysentery associated with the usual large amoebae developed. The author concludes that the amoebae of the monkeys behave as regards pathogenicity to kittens exactly as do *E. histolytica* from human beings.

C. M. Wenyon.

ADLER, S. & FONER, ANN. The Lytic Action of Normal Faeces on the Vegetative Form of *Entamoeba histolytica*. *Harefuah*. Jerusalem. 1946, May 15, v. 30, No. 10. [In Hebrew 237-9. English summary 239.]

Having been called *histolytica* in stools, the authors *histolytica* cultures of the amoeba. It was *histolytica* and diminished to such an extent that it was difficult to demonstrate them. It was evident that they were being destroyed by the faecal material. The phenomenon was tested more accurately by mixing known concentrations of amoebae with known quantities of faeces, keeping the mixture at 37°C. and making counts at intervals. It was clear from these quantitative investigations that the addition of vegetative *E. histolytica* to normal faeces is followed by a rapid destruction of the amoebae. The greater part of this destruction occurs within two minutes. In one case the contact with faeces induced encystment of the amoebae. With certain pathological stools the destruction was less rapid, while with stools of several cases of amoebic dysentery the amoebae appeared to survive for longer periods.

C. M. Wenyon.

JONES, W. R. The Experimental Infection of Rats with *Entamoeba histolytica*; with a Method for evaluating the Anti-Amoebic Properties of New Compounds. *Ann. Trop. Med. & Parasit.* 1946, July, v. 40, No. 2, 130-40, 7 figs. on 2 pls. & 3 text figs. [16 refs.]

Earlier attempts to infect rats with *E. histolytica* had given uncertain results, the author investigated *E. histolytica* and modified techniques. Direct injection of *E. histolytica* after laparotomy into 46 three-month-old rats failed entirely, though purging, starving, modification of diet and occlusion of the anus were tried. Better results were obtained by first establishing an infection in kittens by rectal injection of culture and then inoculating the dysenteric stools of the kittens intracaecally into rats. Not only were the rats parasitized by *E. histolytica* but at autopsy some showed marked inflammation and even ulceration of the caecum, while section of the tissues revealed extensive invasion of the gut wall. In attempts to produce infection by injection of the same material rectally only

two of eleven became infected but these had ulceration of the caecum when examined after 28 days. A series of photographs shows the external appearance of the inflamed caeca of four rats and the microscopic changes which occur in the invaded intestine.

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infection was at its height in 3-6 days and that it might gradually disappear.

of the faeces

It was later found that if cultures of *E. histolytica* were mixed with mucin the mixture injected intracaecally produced infections as did the kitten material. With this mixture a standard test for chemotherapeutic agents was worked out. Five groups of 12 rats are infected with a mucin culture mixture containing one million amoebae per cc. Each rat receives intracaecally 0.2 cc. of the mixture. This operation can be carried out with the aid of an assistant at the rate of 50 to 55 rats an hour. Four of the groups are dosed with the drug 24 hours after operation. One group serves as the control. Six days after operation the rats

respond in the same way to emetine hydrochloride. In the investigation it has been found that the drugs which are used for the treatment of amoebic dysentery in man—emetine, chiniofon, carbarsone, stovarsol—show up favourably, so that there is a hope that the test employed may lead to improved methods of treatment. Penicillin only gave some indication of activity when administered in large doses every three hours.

C. M. Henyon

BROWN, A. G. Amoebiasis. [Correspondence.] *Brit Med J* 1946, Nov. 30, 838.

This letter draws attention to the possible spread of amoebiasis in Great Britain where rural sanitation still exists and to the possible infection of food by cyst passers. The writer is impressed with the provocative action of emetine—gr. $\frac{1}{2}$ –1 by injection nearly always produces cysts the next morning. They usually contain one or two nuclei which indicates that they wish to find a new host in a hurry. [The evidence for these statements is flimsy indeed.]

P. Manson-Bahr

MORTON, T. C. Diagnosis of Chronic Dysentery in Service Personnel. Analysis of 1,000 Sigmoidoscopies. *Brit Med J* 1946, Dec. 14, 890–93.

A thousand sigmoidoscopic examinations were performed on Service patients invalided with a diagnosis of chronic amoebic or bacillary dysentery.

Sigmoidoscopy was carried out in the knee-elbow position without an anaesthetic. The new type sigmoidoscopes were employed which take a 6-volt car bulb light, giving excellent illumination with a magnifying $\times 4$ eyepiece. No preliminary washout within six hours must be given, because it renders the mucosa hyperaemic and identification of the "raised crateriform pits" impossible. The following preparation is recommended: A light lunch and tea is followed by a washout with tap water at 8.0 p.m. No supper is given that night. No breakfast is allowed on the morning of the examination. The bladder should be empty. A scraping and swab from any suspicious area should be mounted and examined without delay for *E. histolytica*. A warmed plate of Hynes's modification of Leifson's desoxycholate citrate medium should be inoculated and cultured. Any faeces adherent to bowel wall are examined for *E. histolytica*.

Among 1,000 patients sigmoidoscoped, only 513 gave positive findings. In the remaining 487 sigmoidoscopy and laboratory investigations were negative. The findings were: amoebiasis 215 (mixed amoebic and bacillary 11); bacillary dysentery 52 (Shiga 2, Schmitz 3, Sonne 4, Flexner 43). In approximately 20 per cent. of 215 amoebic cases, sigmoidoscopic appearances were normal. In bacillary dysentery, out of 52 positive findings the appearances were normal in 9.

Amoebic ulcers conformed to text-book descriptions, but five amoebomata were encountered in unrecognized amoebiasis.

Raised crateriform pits pathognomonic of quiescent amoebiasis were present in 169 patients, and in 78 of them *E. histolytica* was found in the faeces. The pits are circular in shape, 1-2 mm. in diameter, and raised 1 mm. above the surrounding surface. It is usually impossible to find *E. histolytica* in scrapings taken directly from the pits. Cases showing the characteristic appearance should be treated, even if the stools are negative. In a small number of cases in which these pits have been seen after treatment relapses occurred sooner or later. They must not be confused with the pseudocystic "sago-grain" follicles which sometimes follow bacillary dysentery.

Swabbing gives rise to petechial bleeding which is suggestive and can be confirmed by creating an artificial diarrhoea by means of salts in order to provoke the appearance of *E. histolytica* in the faeces.

Depressed pits were seen in 126 cases and *E. histolytica* was found in 20 of them. It is explained that active lesions are present at a higher level of the colon in the negative cases. "Pitting" in healed bacillary dysentery cases is uniformly re detected remainder,

Ten cases of amoebic liver abscess occurred in this series. In two, spontaneous rupture into the peritoneum was diagnosed at operation and in both the abscess was situated in the left lobe. In a total of 60 cases of amoebic hepatitis, four only developed in England. A moderate leucocytosis was found to be of value. The lowest white cell count was 14,200 per cmm. and the highest 27,500. The average was 15,800 with 75 per cent. polymorphonuclears.

Amoeboma is a hyperplastic localized tissue reaction, chiefly affecting the submucosa, which is infiltrated with lymphocytes, histiocytes and plasma cells, together with *E. histolytica* in localized clusters. It is relatively rare.

Five cases were detected, and in four the growth was in range of the sigmoidoscope. The usual symptoms evoked are intermittent attacks of diarrhoea and constipation. Blood is occasionally passed and may be attributed to concurrent haemorrhoids. Diagnosis by scrapings is the best and surest method. Stenosis of the bowel is often present, but after a course of emetine and penicillin the growth melts away.

Stricture of the rectum, as a remote complication of amoebic dysentery, rarely occurs. One case in the series was open to some doubt. Although proven to be

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ulcer in the caecum occurred once and was successfully closed by operation.

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finger and the pronounced induration suggested malignant disease rather than amoeboma.

Lamblasis. Cysts or free forms were found in only 40 cases in 18 no other cause could be found for the diarrhoea and symptoms disappeared after mepacrine therapy. The surprisingly low incidence is ascribed to repeated therapeutic courses of mepacrine for malaria.

Bacillary dysentery. The large number in which the causative organisms were cultured is ascribed to the extreme selectivity of modern media. In 31 out of 52 cases the diagnosis had not been made overseas and the majority had received amoebic treatment without benefit.

The sigmoidoscopic appearances were —

- (1) generalized hyperaemia with excess of mucus
- (2) generalized hyperaemia with tubular stenosed lumen with a granular appearance bleeding readily on instrumentation. The prognosis is poor
- (3) superficial oval or circular ulcers up to 1 cm. in diameter, the bowel

- (4) - - - - - dysentery is a pseudo-crypts of Lieberkuhn diameter scattered over the mucosa. On rupture there exudes clear or blood stained mucus from which the causative organism can be isolated. From one case, who was invalided from Italy with a diagnosis of polyposis, *Sh. flexneri* III was isolated.

Seven cases of *ulcerative colitis* were diagnosed in which laboratory investigations and agglutination tests were negative. The association with bacillary dysentery was not confirmed.

Four cases of *hyperplastic colitis* were seen in which the sigmoidoscopic appearances were deep greyish depressions the site of healed ulcers surrounded by overhanging hypertrophied bridges of red mucosa. The mucosa bridged the depressions and in one instance divided the lumen into two. The symptoms

were pain and bleeding following constipation; and in one case it was necessary to divide a band of mucosa. Agglutinations for *Sh. flexneri* were positive 1/50 in one case. It is probable that this condition is an excessive healing response to extensive ulceration of bacillary dysentery.

Post-dysenteric colitis. In 16 cases, residual colitis persisted after treatment. One patient had to be invalided: in the others, a slow gradual improvement has taken place.

The sprue syndrome. Numerous patients have been invalided with a diagnosis of sprue or para-sprue. In some cases, the syndrome has developed within four months of arrival in India. Eighty cases were sigmoidoscoped and investigated. It was found that 46 per cent. were found to be harbouring pathogenic intestinal protozoa or bacteria and that, when these were eradicated, the sprue symptoms responded to the routine orthodox treatment for sprue. This series is compared with a larger one of 152 similar cases investigated in

P. Manson-Bahr.

WARSHAWSKY, H., NOLAN, D. E. & ABRAMSON, W. Hepatic Complications of Amebiasis. *New England J. of Med.* 1946, Nov. 7, v. 235, No. 19, 678-81.

Report of four cases.

LEWIS, R. A. Enteric Infections and their Sequelae. *New England J. of Med.* 1946, Oct. 17, v. 235, No. 16, 571-81. [12 refs.]

Acute dysenteric diseases have been studied in many overseas hospitals, but follow-up studies are scarce. The cases referred to in this paper were observed in a U.S. Army general hospital during the latter half of 1945. All patients had a final check-up, so as to provide treatment. Practically all were diagnosed in a quarter of the cases *E. histolytica* was larger in the United

States than overseas.

The incidence of hookworm was identical, but more were found to have been infected than overseas. Of the 105 only two had never been overseas, Some with no symptoms and ova and ova in the stools, were classified as carriers.

In amoebiasis, strongyloidiasis and schistosomiasis there were more patients with symptoms than there were carriers.

of clinical diagnosis of amoebic hepatitis and for prompt emetine treatment.

Tissue invasion by *E. histolytica*, which can usually be verified by positive

well as after bacillary dysentery. A large proportion of cases regarded as

[March 1946]

unclassified dysentery will be found to have steatorrhoea on analysis of the 24 hour stool for fat. Most of them correspond to early stages in the development of sprue and despite loss of weight there may be no sign of vitamin deficiency. These patients respond well to a diet strictly limited in fat and high in protein and carbohydrate.

HOLLER G & ZAJITSCHEA R. Vorschlag einer Methode zur Entkeimung von Amöben und Bazillenträgern [A Method for sterilizing Amoebic- and Bacillary Dysentery Carriers.] *Wien med Woch* 1946 Jan. 13 v 96 Nos 1/4 27 P Manson Bahr

In amoebic dysentery bacillary dysentery and typhoid fever small numbers of the causative organisms give rise to infection on being swallowed and subsequently large numbers of the organisms are voided in the excreta. During war these diseases flourish and are disseminated by numerous carriers. This paper is concerned with the means of sterilization of such carriers. The usual method of eradicating such an infection is the administration of drugs to destroy the amoebae. The restoration of the bowel to normal will however achieve the same result. To achieve this healing of the bowel the treatment advocated by Eppinger was adopted. Eppinger's treatment for colitis consisted of the introduction of 5-8 per cent glucose solution by rectal drip to a total volume of 1 litre over a period of 2-3 hours. This cleanses the bowel wall of its inflammatory exudate and increases healing by promoting an increased blood supply to the area. Six cases of chronic amoebic dysentery previously repeatedly treated unsuccessfully with a variety of drugs in various combinations by the authors and by others were given rectal injections of hypertonic glucose solution (10 to 20 per cent) as outlined above daily for periods up to 10 days in some cases these were repeated on a second or a third occasion at times concurrently with some of the usual anti amoebic drugs. In every one of the six cases the *Er. amoeba histolytica* infection of the gut was eradicated by the treatment.

A carrier of a bacillary dysenteric infection of the bowel remains chronically ill with bacillary dysentery and from time to time passes stools containing bile and mucus with many bacilli. In such cases chemotherapeutic remedies (Elvedron Enda-in (ibazol etc.) will rapidly eradicate the specific bacillary infection. These drugs should be used to this end and healing of the bowel wall should then be ensured by hypertonic glucose enemas.

In the case of typhoid carriers infection of the biliary tracts and gall bladder results in the passage of organisms from these sites in the stools. Infection of the pancreas or the villi of the small intestine and of the appendix also contributes organisms to the stool. These carriers are intestinal excretors of the bacilli they may be temporary or permanent the former being convalescent from an attack of the disease and excreting bacilli for not more than three months. Urinary excretion of bacilli occurs similarly.

There is no specific chemotherapeutic remedy for the typhoid and paratyphoid infection but HOLLER, MARTIN and ORTNER found nitroacridine (Bayer 3882) in doses of a heaped teaspoonful six hourly to clear the blood of bacilli by the tenth day in all but one of 150 cases. In this single case a second course of the drug achieved the desired result. Nevertheless bacilli could be recovered after this treatment from the urine and faeces of these cases but no chronic carrier state developed in any of them. The observation has been confirmed by the treatment of a further 50 cases and again with one exception no bacilli could be found in the stools one month after the fever and none were found in the urine at the end of the acute stage.

Temporary carriers are numerous after an attack of enteric, and chronic intestinal carriers develop in 1-10 per cent. of cases; chronic urinary carriers are much less numerous, but are very persistent (70 years in one case). Among 317 cases of enteric seen by the authors during the previous ten years 11 became chronic urinary and 32 chronic intestinal carriers. In the 200 cases treated with nitroacridine (Bayer 3582) not a single case became a chronic carrier. Sixteen proven chronic intestinal carriers were treated with the drug and all but two were sterilized of their infections; these two resisted further repeated attempts at sterilization. Experience has indicated that nitroacridine (Bayer 3582) readily sterilizes urinary carriers.

As rectal injections of hypertonic glucose solution would not reach the sites of lodgement of bacilli in intestinal carriers of enteric, the authors resorted to irrigation through a duodenal tube (1 litre of 10-20 per cent. glucose solution in 3 hours on alternate days). This method has proved of value in the treatment of cholangitis, cholecystitis and cholelithiasis, probably as a result of mechanical increase in bile secretion. Duodenal irrigation alternating daily with rectal irrigation for 10 days was tried in intestinal carriers of enteric. Details of six representative cases are recorded, four of them temporary (convalescent) carriers and two chronic carriers; this treatment either alone or in combination with nitroacridine (Bayer 3582) treatment ensured sterilization of the infection in all six.

Alimentary carriers of enteric are apparently healthy persons, with no clinical symptoms of disease.

They do not necessarily themselves become infected with them. They may, however, become chronic carriers, or they may develop acute typhoid. A chronic carrier, also, may develop acute typhoid; two cases are cited to illustrate this.

A. R. D. Adams.

MANDOUL, R. & PAUTRIZEL, R. Régime alimentaire, chimisme intestinal et parasitisme. [Diet, Intestinal Chemistry and Parasitism.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 5/6, 222-6.

The authors refer to the recent article by CHORINE and TANGUY [this *Bulletin*, 1947, v. 44, 211] who showed that during the war the incidence of intestinal protozoal infection had increased considerably. They attributed this to the changes in the diet. The present paper have found a similar increase in the present paper have found that the direct cause is the increase in the concentration of amino-acids, increases which are not always disclosed by the pH. These increases are due to the putrefaction set up by the proteolytic bacteria, which in their turn are favoured by the hypersecretion of mucus and nucleoproteid resulting from the excessive development of the saccharolytic bacteria and the consequent acidity.

C. M. Wenyon.

SARROUY, C. & COMBE, P. Notes sur les syndromes digestifs graves d'été du nourrisson en Algérie et leur traitement d'urgence. [The Treatment of Acute Summer Digestive Disturbances in Algeria.] *Algérie Méd.* 1946, July-Aug., No. 4, 307-20.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

HADDAD C SHEIBAN A & BLDEIR R. Louse Borne Relapsing Fever in Haifa *J Palestine Arab Med Ass* 1946 Nov 1 2 No 1 8-14 [12 refs]

The symptoms complications and treatment of 200 cases of louse-borne relapsing fever seen in Haifa are described. A comparison with the epidemic which raged during the first World War (1914-1919) points to the fact that the present epidemic is of a lighter character. In a future paper it is intended to describe the cases of tick borne recurrent fever which came under our observation in Haifa.

FISCHER Isadore. Penicillin Therapy in Relapsing Fever. Report of Case *Amer J Trop Med* 1946 July 1 26 No 4 483-8 1 fig

VAN RIEL J, Le foyer centro-africain de leptospirose (Contribution au

[231 refs]

A valuable study of the complex problem of the unity or plurality of Leptospiruses based mainly on the author's observations on local strains of the disease in the neighbourhood of Lake Kivu Belgian Congo.

Weil's Disease infectious jaundice with relapses is stated to be really only one of the types and not the most frequent of a very variable infection. In the region of Lake Kivu a wide range of clinical varieties was found including anicteric forms and also the curious meningitic type of the disease. The

According to the plurality theory strongly advocated by Schuffner there

Thus only 24 cases of Andaman A have been identified in those islands 90 cases of Pomona in Australia and only 22 cases of *Cunicola* in man. Sejro Leptospirosis has been found 3 times in Denmark and 13 times in Italy. Yet these few cases have been made the basis of conclusions as to the

L. bahriae the third the Benjamin strain from the Dutch East Indies but also reacted with other strains the fourth and fifth were each new types and finally the three last groups seemed to be related to both *L. icterohaemorrhagiae* and *L. cunicola*.

The clinical symptoms are next considered and it is shown that in the Congo there is no correlation between the aetiological agent and the clinical type.

Attention is also called to similar discrepancies in other parts of the world. Concerning geographical distribution, 31 serological types are listed in tabular form, together with the countries in which they occur. This distribution can be seen to follow no obvious rule, for one strain may be recorded from the Belgian Congo, Europe and the Andaman Islands; another from the Belgian Congo and Indonesia, etc.

The part played by animal reservoirs is then criticized and attention called to the marked lack of correlation between murine and human endemicity. Epidemiology is next considered and the incidence of the disease shown to be consistent with the view that it is essentially an occupational hazard, and that in the great majority of cases the infection is derived from water. The relation between the saprophytic *L. biflexa* and the pathogenic spirochaetes which have been isolated from water or mud, is reviewed. Finally pathogenicity in guinea pigs is considered and the author's results do not confirm the view that each serological type of *Leptospira* has a characteristic virulence in this animal. The pathogenicity varies according to the method of infection, age of culture, and many other factors; also the receptivity of different races of guinea pigs is variable. For example, in Capetown the author was unable to infect the guinea pigs at the local Medical School with three strains that had given lethalities of 37, 69 and 92 per cent. respectively in the Belgian Congo guinea pigs. The so-called *L. grippotyphosa* is generally stated to be hardly pathogenic and feebly icteric in the guinea pig, but in the author's hands gave a high mortality with frequent jaundice.

The author concludes that at present in addition to *L. biflexa*, the only established species of *Leptospira* are *L. icterohaemorrhagiae*, *L. hebdomadis* or some allied species. [This interest in the subject of Leptospirosis

...the water origin of ... attention in recent years.]
E. Hindle.

JACKSON, H. & OLEESKY, S. An Unusual Case of Weil's Disease. *Brit. Med. J.* 1946, Nov. 30, 813-14.

LEPROSY.

MOISER, B. Leprosy: a New Outlook. *East African Med. J.* 1946, Oct., v. 23, No. 10, 295-300.

This paper deals with the same work as one already reviewed [see this *Bulletin*, 1946, v. 43, 454]. The author thinks that if the name of Hansen's disease is substituted for leprosy "you have got rid of the dread of the disease." He can find no evidence that either compulsory or voluntary segregation has ever reduced leprosy, but he advocates the latter. He states that the disease is a rural, family and home disease, but he thinks it "a complete fallacy to say that long continued, close, intimate contact is necessary for the transmission from the diseased to the healthy," and he knows of no "facts that have ever been brought forward to prove this." He has therefore sought for a new outlook and thinks he has found it through the observations recorded in his previous paper that cockroaches, both in leprosy hospitals and after feeding the insects on leprosy patients (but also in those found in villages with no cases of leprosy) may show in the intestinal canal oval acid-fast staining bodies which he assumes to be a stage of a pleomorphic lepra bacillus, and which may be found in the

droppings of cockroaches up to at least sixteen months. He states that these insects bite mankind and acid fast or advocates further research on these lines with the aid of a mobile laboratory. Definite proof of his hypothesis can only be obtained by experiments on man the validity of which he is doubtful about. *L. Rogers*

FLOCH H & DE LAJUDIE P. Sur la lèpre en Guyane Française I Généralités Répartition par âge Dépistage Contamination [Leprosy in French Guiana] Institut Pasteur de la Guyane et du Territoire de l'Inini Publication No 131 1946 July 6 pp [10 refs]

The author quote times in this French to 1937 the number among the penal element increased from 24 in 1897 to 130 seen from 1924 to 1928. Since the formation of the Institut Pasteur in the colony in 1914 more attention has been paid to leprosy and from 1925 to 1946 1 447 cases have been recorded and in the last named year 1 131 cases were known against 677 at the end of 1938. That makes 5.1 per cent of the estimated population of 22 000 to which must be added an estimated 300 cases to bring the per

of such cases. Conditions under which infections occurred are most commonly family contaminations and no evidence of the disease being hereditary was met with. School infections were also frequent. Neuromacular cases were the most common form. *L. Rogers*

MONTÉL R & GIROLD P. Affinités tinctoriales du bacille de Stefanski (Méthode de Macchiavello) [Staining Reactions of Stefanski's Bacillus] Bull Soc Path Exot 1946 v 39 Nos 7 8 248-50

The following is a translation of the authors' summary.

In smears and frozen sections of rat lepromata it was possible to distinguish two different morphological forms of Stefanski's bacillus when the preparations were stained by Macchiavello's method without previous fixation. In one form the organisms were unstained, refractile and in very large numbers; the others were much smaller, stained a ruby red colour, were slender and very scanty.

These observations confirm those already made by one of us regarding Hansen's bacillus (*Mycobacterium leprae*) in the blood of leprosy patients [See also this Bulletin 1946 v 43 1152 bis] *H. J. O. D. Burke Gaffney*

LURTADO J. J. Da possibl. enzima segregada pelo *Mycobacterium leprae* [A Possible Enzyme separated from *M. leprae*] Publicações Farmacêuticas São Paulo 1946 July v 12 No 45 15 17 19 [19 refs]

COCHRANE R. G. MENON K. P. & PANDIT C. G. A Further Note on Inoculation of Monkeys with Human Leprosy Material after Splenectomy Internal J Leprosy Cleveland Ohio 1945 Dec. v 13 88-97

The authors have previously reported on seven monkeys inoculated with leprosy material after splenectomy with possible evidence of dissemination of

the infection in one; a failure they attribute to individual variability of resistance. They now report on sixteen further inoculations of monkeys with the following results. In Series A, three splenectomized monkeys were inoculated with leprosy material on several occasions. No general dissemination of the infection was obtained. In Series B, three monkeys were splenectomized and inoculated with leprosy material and also fed on *Colocasia antiquorum*, on the
 a diet predisposes
 be that of leprosy,
 wo of the animals
 of infection was
 found in any of these animals. In Series C, India ink was first injected to block the reticulo-endothelial system in three monkeys, but again no disseminated infection was produced. The interesting observation was made that all the animals, except those in which India ink was injected, tended to develop strong positive lepromin reactions after the third inoculation. *L. Rogers.*

COCHRANE, R. G. & RAMANUJAIN, K. Inoculation of Monkeys with Human Leprosy Material. *Internat. J. Leprosy*. Cleveland, Ohio. 1945, Dec., v. 13, 98-100, 3 figs. on 1 pl.

In this further paper the whole of the 38 inoculation experiments on monkeys during six years' work are summarized and the most important details shown in convenient tabular form. The lepromin reactions mentioned in the preceding abstract are also tabulated. It is suggested that *M. leprae* cannot parasitize the reticulo-endothelial system unless it multiplies in the corium of the skin; so blocking that system would not result in the development of progressive leprosy. The authors also conclude that a positive lepromin reaction could only be obtained in an animal after a primary focus had been established, such as by the intra-abdominal implantation of a nodule as was done in many of these experiments. They also suggest that in tuberculoid leprosy, the formation of epithelioid foci result in anchoring the bacilli and preventing their dissemination throughout the reticulo-endothelial system. Work will be continued with a view to breaking down the tissue defence reaction and to obtain disseminated infections. *L. Rogers.*

HANKS, J. H. The Fate of the Bacilli in Incubated Lepromatous Tissues and the Question of Microscope Growth. *Internat. J. Leprosy*. Cleveland, Ohio. 1945, Dec., v. 13, 9-24. [16 refs.]

This is an important study of the difficult question as to whether lepra bacilli multiply in tissue cultures or not. Many have claimed that the bacilli multiply on media inoculated with small fragments of leprosy tissues, which may contain so many organisms as apparently to form almost one-third of the area in stained sections, and probably constitute 20 per cent. of a richly infected leproma. Thus a ten-fold increase in the number of the bacilli should double the size of the implanted tissue. Quantitative estimations of the bacilli have therefore been made in incubated lepromatous tissues by methods which should detect with certainty a two-fold increase of the organisms. After control counts had been made, 2 mm. cubes of lepromatous tissues, previously tested for their sterility, have been incubated on culture media in tubes or flasks of various culture media and under varying conditions which have been reported as favourable to cultures. After various periods of time, estimations of the number of bacilli in the tissue cubes have been made with the greatest care, for details of which the original paper should be consulted.

The results of the tests are shown in tables with regard to four liquid media namely (1) liver infusion hormone glycerol agar in air (2) the same in a gas mixture of 10 per cent CO_2 and 40 per cent O_2 (3) serum serum digest Long's medium and 929 pH plus the gas mixture and (4) peptic globulin digest Long's medium 929 pH and yeast extract gas mixture Incubation was carried on for three to six months but no definite increase in the number of the lepra bacilli could be demonstrated In two more experiments with

have multiplied On several occasions what appeared to be minute colonies were found microscopically to be small collections of lipid material and not bacilli In the present experiments when the tissues were completely disintegrated and suspended before estimating the number of the bacilli recoverable from the tissues it became evident that growth did not occur *L Rogers*

DHARMENDRA & SEN N R Study of Leprosy in a Family *Leprosy in India* 1946 Apr v 18 No 2 54-7

The authors met with five early neural cases of leprosy in one family who attended the leprosy department of the Calcutta School of Tropical Medicine

among whom a few cases apparently of a lepromatous type were present from whom the infection was probably derived Lepromin tests were carried out in 26 of the 28 members of the Calcutta family with positive results in 25 This showed high resisting powers which is in accordance with only neural cases having developed *L Rogers*

DHARMENDRA & SANTRA I A Study of the Course of the Disease in Leprosy *Leprosy in India* 1946 Apr v 18 No 2 43-50

This paper records the findings of a survey of 248 cases observed for ten years in the area of the Bankura leprosy centre and 88 cases seen for at least five years before death or disappearance Only one-fourth of them were treated irregularly at clinics with apparently less success than the untreated At an early survey only 26 per cent were lepromatous and remaining nerve cases were mild in type After the famine of 1943 the proportion of lepromatous cases fell to 15 per cent owing to deaths but the neural cases increased Among 268 neural cases definite improvement or complete subsidence occurred in over 40 per cent only 26 per cent became worse including 25 per cent who became lepromatous all of these were macular with negative lepromin reactions the prognostic value of which is confirmed *L Rogers*

RADNA R Sur l'évolution de certains cas de lèpre neuromaculeuse [The Evolution of certain Cases of Neuro-macular Leprosy] *Ann Soc Belge de Med Trop* 1946 June 30 v 26 Nos 1/2 89-93

The statement of R G COCHRANE that many cases of leprosy never become active has led the writer to record his experience on the evolution of early

neuro-macular cases. Among 55 untreated Ns 1 cases, with few bacilli in the lesions, examined in 1935 and again in 1940, 29 had remained stationary, 4 had improved and 22 were worse, and one of the latter had developed towards the lepromatous type. Further, among 34 early neuromacular tuberculoid cases, Nt 1 of the Cairo nomenclature, 21 showed no change, 6 had improved and the remaining 7 had grown worse; one of these had developed towards the lepromatous state (L2), in 4 more the skin lesions had increased and in the remaining 2 grave mutilations had occurred. On the other hand, among similar patients treated with oil of Calonecha and sodium gynocardate rapid improvement took place, which the author regards as being due to specific treatment with favourable results. He agrees with other workers that treatment is least effective in the case of patients in poor general condition, which is often due to helminthic and other complications. *L. Rogers*

DAVEY, T. F. Some Observations on the Role of Allergy in Leprosy (2). Part II. Allergy and the Macular Series. *Leprosy Review*. 1946, Oct., v. 17, No. 3, 75-87. [10 refs.]

The author considers that the three recognized varieties of macular leprosy, namely, lepromatous, simple neural (flat) macules, and tuberculoid macules, are insufficient for the description of this type of lesions. He considers that a larger variety of forms occur shading one into another and varying between the mildest one, namely localized lesions of the mildest tuberculoid form and pale flat macules, up to—at the other end of the scale—innumerable poorly defined macules of the lepromatous group with no effective localization and representing a temporary phase in the advance of the infection. The mild

reactions in six groups that are described gives progressively more doubtful or negative reactions as the lepromatous type is approached. In the raised macule series, positive results were 77-90 per cent. *L. Rogers.*

TISSEUIL, J. Essai d'interprétation de la réaction de Mitsuda. [Interpretation of the Mitsuda Reaction.] *Bull. Acad. Méd.* 1946, v. 130, Nos. 27/28, 499-502. [26 refs.]

This is a brief discussion of the nature of the Mitsuda reaction. The author points out that in cutaneous leprosy the reaction is negative, because all the tissues, even those apparently healthy, contain the lepra bacilli, and it is specific because other acid-fast bacilli, including those of Stefansky, give positive reactions. Moreover, in lepromatous cases the reaction becomes positive in the case of cures with disappearance of the lepra bacilli from the tissues, and it again becomes negative in the case of relapses of the infection. The true nature of the reaction in this class of cases remains to be determined. On the other hand, in tuberculoid leprosy the reaction is positive both in the healthy and in the involved skin, although very few bacilli are present in the thickened patches; but it is not specific, because reactions are also produced by paratuberculous bacilli, such as those of Kedrowski and of Clegg, as well as by Stefansky's bacillus. In this form, it is therefore difficult to speak of allergy because different bacilli give reactions. In healthy persons reactions are obtained in some cases. *L. Rogers.*

WHARTON, L. H. Promin Therapy *Leprosy Review* 1946, Oct., v. 17, No. 3, 96-8

The author reports on the treatment with promin for one year of seven C3 epromatous cases of leprosy in the British Guiana leprosy hospital, all young adults who were rapidly going downhill under chaulmoogra treatment. They

est, and the dose gradually increased by 1 gramme weekly to a maximum of 5 grammes. After six weeks' treatment one week of rest was allowed. At the end of a month general improvement was seen, after three months ulcers were healing and oedema subsiding, the eye conditions appeared to be arrested, and in six months chronic ulcers had healed and nodules were flattening. During the second six months improvement continued, but in seven cases *M. leprae* bacilli had decreased in the nodules, but not in the nose. *L. Rogers*

FAGET, G. H., POGGE, R. C. & JOHANSEN, F. A. Promizole Treatment of Leprosy. A Preliminary Report. *Pub Health Rep Wash* 1946, June 28, v. 61, No. 26, 957-60. 4 figs on 3 pls

Promizole is the trade name for 2,4'-diamino-5-thiasolyl phenyl sulphone. It was made as a less toxic compound than promin. It did not give encouraging results in tubercular disease except in skin forms, but was considered worthy of trial in leprosy on account of its relative non-toxicity by the mouth and its close resemblance to diasone. The present preliminary report is published because it appears to produce more rapid clinical progress than the other two mentioned sulphones. Among 11 patients treated for one year, it was given up in two because of toxic reactions, 1 absconded and 1 died of a cerebrovascular accident. After six months' treatment with doses of 0.5 gm. gradually increased

ones, and that definite flattening of nodules (and in some healing ulcers) have resulted. The former is clearly indicated in the photos. *L. Rogers.*

FAGET, G. H., POGGE, R. C. & JOHANSEN, F. A. Present Status of Diasone in the Treatment of Leprosy. Brief Clinical Note. *Pub Health Rep Wash* 1946, June 28, v. 61, No. 26, 960-63, 1 pl

This is a further report on the diasone treatment at Carville in 104 cases of leprosy during 2½ years. The drug was given orally in adults in daily doses gradually increased from 0.33 gm. to 1 gm. and from 0.17 gm. to 0.5 gm. in children. It is usually well tolerated orally, while promin has to be administered intravenously on account of its toxicity. Among 66 patients treated for 6 months or more, 74.2 per cent. were predominantly lepromatous, 20.4 per cent. were mixed and only 5.4 per cent. were neural. In only 19 per cent. were the lesions minimal. At present, 24 per cent. of the treated patients are now bacteriologically negative; this compares favourably even with promin. Objective improvement in nodules has been observed in 65 per cent. of the patients, 23 per cent. show subjective improvement and none is worse. The treatment was discontinued in 31 or 29.8 per cent. of the total cases; these include 6 absconded, 10 showed increased erythema, nodosum or eczema, 5 gastric intolerance, 4 haematuria (not seen since early doses were reduced from 1 to 0.33 gm.), 2 anaemia, 2 iridocyclitis, 1 drug fever and 1 hypertension.

Notes and illustrations (those of diasone and of promizole treatment respectively have been misplaced) show definite subsidence of nodular lesions, and 1 of 4 cases of which brief notes are given, had become bacteriologically negative. The authors' therefore conclude that diasone given orally usually improves cases clinically within six months.

L. Rogers.

Muir, E. Diasone in the Treatment of Leprosy. *Leprosy Review*. 1946, Oct., v. 17, No. 3, 87-95.

This is a paper on the treatment of 12 cases of leprosy in England, 10 of which were in a fairly advanced lepromatous stage; the other two were intermediate ones and strongly positive bacteriologically. The usual dose is one gramme a day as twice that dose produces anaemia. It is administered in capsules, each containing $\frac{1}{2}$ gramme, one of which was given on alternate days three times a week, increased in cases showing no contraindications by one capsule each day until a maximum of six capsules are given on each of three days in a week. If any anaemia occurs with haemoglobin below 75 per cent., iron, with liver or yeast, is also given. After each three weeks of full dosage a week's rest from the drug is given. If a reaction occurs the drug must be stopped until it has completely subsided. Tolerance is soon acquired and the dosage may then be pushed up to twelve grammes a week for three weeks in each month. Short notes are recorded of the 12 cases, with the following results. A noteworthy effect was improvement in the condition of the eyes in four cases in which complete blindness might have been expected to result. In seven cases, prolonged chaulmoogra treatment for years had not prevented deterioration in the condition, but after a few weeks' treatment with diasone all had made steady improvement. The cessation of febrile reactions and new crops of nodules was especially noteworthy, but it is too soon to say what the ultimate results will be, and it cannot yet be said whether the drug can be prepared in large quantities at a cost which would allow of its general use in very large numbers of leprosy patients.

L. Rogers.

INTERNAT. J. LEPROSY. Cleveland, Ohio. 1945, Dec., v. 13, 67-81. The Problem of Home Isolation of Lepers in the Philippines. By the Leprosy Advisory Committee of the Director of Health.

As a result of repeated attempts of the Philippine Assembly to modify the compulsory segregation law to permit of more home isolation, the Director of Public Health obtained the opinions of some members of the staff of the Bureau on the subject, which are summarized and discussed in this paper. Under the existing law, only bacteriologically positive patients are isolated, and about 3,000 early and little infective nerve cases are being treated, with very encouraging results, at home or at clinics. The early very rigid segregation has been modified by the paroling of negative cases since 1922, the establishment of treatment stations in 1928 which permitted the isolation of patients since 1935, and the emphasis is placed on the treatment of patients at home and the isolation of patients in clinics. The findings of leprosy conferences and commissions are quoted, in the light of which the practicability of home isolation is considered. The conclusion is arrived at that at the present time it would not be either practicable or wise to adopt such a measure in a highly endemic country such as the Philippines.

L. Rogers.

HELMINTHIASIS

ZARROW, M & RIFKIN, H. Intestinal Parasites diagnosed at an Army General Hospital in the South Pacific. *Amer J Med Sci* 1946, Sept., v 212 No 3, 289-93 [14 refs]

Routine stool examinations were carried out on patients admitted to a

MUMFORD & MOHR 1944 see this *Bulletin* 1945 v 42 468 and 1944 v 41, 965]

A zinc sulphate concentration method was used. The findings of protozoa were based on 4 323 stool examinations on 1 114 patients with an average of 3.8 examinations per patient. *Entamoeba histolytica* was found in 4.9 per

intestinalis and *Isoospora hominis* (each 0.35 per cent) and *Chilomastix mesnili* (0.28 per cent).

The findings of helminthic infections were based on the examinations of 11 358 stools from 3 415 patients. 3.3 stools per patient. The main findings were hookworm (13.2 per cent), *Ascaris* (1.5 per cent), *Hymenolepis* (0.41 per cent). *Hymenolepis* cent). The doubtful parasite *Heterodera radiculicola* was found on 6 occasions. Only in the case of hookworm was there any material increase in worm infection above that reported in the general populations in the United States from which the subjects were drawn.

In a series of 167 patients with ankylostomiasis the infection was diagnosed by one stool examination in 76.3 per cent of cases, by two in 89.6 per cent, by three in 95.1 per cent, by four in 98.1 per cent, by five in 99.3 per cent, and in 100 per cent by six stool examinations. L. E. Napier

LOPES, D. M. A eosinofilia provocada no diagnóstico da esquistosomose (Provocative Eosinophilia in the Diagnosis of Schistosomiasis.) *Hospital Rio de Janeiro* 1946 May v 29 No 5 807-10

The following is a translation of the author's summary:—

1. Repeated observation of the eosinophile rate in the blood in cases of schistosomiasis is of definite value in diagnosis and control of treatment.
2. In doubtful cases repetition of the blood examination after further doses of antimony can produce clear negative or positive results.
3. The use of provocative eosinophilia in conjunction with Fairley's complement fixation test is likely to produce a more marked result in those cases where a certain diagnosis or test of cure is required. H. J. O. D. Burke Gaffney

GOLDSTEIN, A. C. Dépistage rapide de la bilharziose en milieu indigène aux colonies par l'intradermo-réaction à *Schistosoma bovis* (Rapid Diagnosis of Bilharzia Infections by *S. bovis* Intradermal Reaction) *Ann Parasit Humaine et Comparée* 1946 v 21 Nos 3/4 129-37 [14 refs]

Every year many native travellers arrive from all parts of the French Sudan in Macina, where they are employed on special public works. Since a considerable

number of these immigrants are suffering from schistosome infestations, and the appropriate molluscan hosts have been found in the neighbourhood, the author feared a massive outbreak of schistosome infection there.

Facilities did not allow of mass microscopic examination or treatment: the author, therefore, impressed by the report of KHALIL and HASSAN [this *Bulletin*, 1932, v. 29, 741] on the *S. bovis* skin reaction, prepared an antigen from this species of schistosome, which is very common in local cattle.

The extract was made with 100 male and female *S. bovis*, crushed in 35 cc. of saline and allowed to soak in the shade in a cool place. The extract was filtered 48 hours later.

The extract was injected into the dermis, as the author found the "cuti-reaction" difficult to interpret in very dark skins. One drop of the filtrate was injected beneath the dermis in the deltoid region, and an injection of distilled

n.

the following reactions:—

F. two to three hours after injection and rarely later, which disappears rapidly in about two hours more.

2. Induration and infiltration of the skin at the site of injection, attaining the size of a small pea. This follows shortly after the rise of temperature and disappears soon after it.

3. Local pain and heat at the site of the infiltration.

In the author's opinion, the induration is the only sign of value, and it is easily seen and palpated.

He obtained positive results in all of 9 persons suffering from schistosomiasis; co ankylostomiasis and fle control subjects.

value in areas where schistosomiasis is endemic, and other diagnostic facilities are not readily available, owing to its simplicity and rapidity.

[The number of cases recorded does not appear to be sufficiently large to justify a final claim of superiority for this method over other recognized tests; but its simplicity for use in remote areas merits further investigation.]

H. J. O'D. Burke-Gaffney.

HALAWANI, A. & HAFIZ, A. Treatment of Urinary Schistosomiasis Haematobium with a Modified Form of Intensive Treatment using Repodral (Fouadlin) Solutions prepared locally from the Powder. *J. Roy. Egyptian Med. Ass.* 1946, July-Aug., v. 29, Nos. 7/8, 238-42.

"1. A method is described for the preparation of repodral solution immediately before use. This consists of dissolving 6.5 gms. of the powder in 100 cc., filtering through a fresh piece of high quality filter paper and sterilised by heating to boiling for 15 minutes. This solution should be used the same day only.

"2. One hundred and three patients completed the treatment in the outpatient [department] receiving each ten injections. Twenty-four of these received two more injections each. Eighty-seven cases became apparently cured, i.e., approximately 84.5 per cent.

"3. Toxic symptoms were generally mild, such as rheumatic pains, herpes labialis, occasionally nausea and rarely vomiting, anorexia and insomnia. Rise of temperature occurred in three patients. Urticarial wheals appeared at the site of injections in one patient. The most severe toxic symptom encountered was dysiderosis which affected all four limbs in two patients. This skin manifestation disappeared completely after cessation of treatment."

NAVAL MEDICAL RESEARCH INSTITUTE Bethesda, Maryland 1946 Apr 16,
Report No 7 Effect of Light and Temperature on Shedding of *Schistosoma*
mansoni Cercariae [KENTZ R E 16 pp [12 refs]

consisted of six combinations of the variable factors (a) Light of ordinary laboratory conditions with room temperature of 24-27°C. (b) Light of ordinary laboratory conditions with temperature 21-23°C (c) In darkness at 24-27°C. (d) In darkness at 21-23°C laboratory condition, at 24-

The snails were removed under conditions which consisted of different combinations of bright light, ordinary light and darkness with temperatures of 17-19°C 21-23°C, 24-27°C, and 30-37°C Cercariae were counted at intervals of 15, 30 and 60 minutes after the altered conditions were initiated

It was found that both light and temperature changes definitely affect the shedding of cercariae but that abrupt changes in temperature exert more influence on the shedding than abrupt changes in light intensity It was possible to force the snails to shed cercariae either three times during the same day or in moderate quantities daily for a period of 5 to 9 days by means of bright light and elevated temperatures (Normally the snails liberate cercariae only once daily, in a single period from 10 a m to 2 p m)

No deleterious effects on the snails or cercariae were observed as a result of this forced shedding
J J C Bickley

HERNANDEZ MORALES F & MALDONADO J F in collaboration with C K PRATT Diagnostico de la esquistosomiasis de Manson por medio de la biopsia del recto Diagnoses of *S mansoni* Infections by means of Rectal Biopsy¹ Bol Soc Med de Puerto Rico 1946 July v 38 No 7 253-63 5 figs

— & — with — The Diagnosis of Schistosomiasis Mansoni by a Rectal Biopsy Technique Amer J Trop Med 1946 Nov v 26, No 6 811-20 5 figs

The authors obtained very satisfactory results with six months trial of a modification of OTTOLINA and ATENCIO'S biopsy of the rectal mucosa in the diagnosis of *S mansoni* infections

The results were compared with concentration methods of stools and antigenic skin reactions both in treated and untreated cases

The biopsy method revealed in the aggregate the presence of ova in 100 per cent of cases while concentration tests produced only 40 per cent of positive results, only 62 per cent were found positive amongst 16 patients upon whom the intradermal test was performed

Positive biopsy results were also found in 70 per cent of treated cases concentration methods were only effective in 18 per cent of these and the intradermal test was very variable in this group
H J O D Burke-Gaffney

VOGEL H Ueber die Nachkommenschaft aus Kreuzpaarungen zwischen *Bilharzia mansoni* und *B japonica* Cross-Breeding of *Schistosoma mansoni* and *S japonicum*] Zent f Bak I Abt Orig 1942, Oct 28 v. 149 No 5 319-33 1 fig

The author in 1941 published the results of pairing female schistosomes with males of another species and showed that they develop normally, copulate and

produce ova, but always of the type of the female worm. Whether further development of such ova would take place was considered a question worth following up and experiments were undertaken to infest some suitable snail intermediate host.

Of the various combinations of the three common schistosomes, *haematobium*, *mansoni* and *japonicum*, two only resulted in enough ova being obtained for further experiment, viz. male *mansoni* and female *japonicum* and vice versa. Eight mice and two hamsters were used for the crossing of male *japonicum* and female *mansoni*, and five mice and two hamsters for the opposite. The results in each of the experimental animals are detailed. They may be summed up as follows: Many, in fact the majority, of those produced do not develop at all, but die in the tissues of the host; a few go on to produce embryos, but usually these soon die and disintegrate; very occasionally the ovum proceeded to the miracidium stage. Those resulting from pairing male *mansoni* and female *japonicum* could infect *Oncomelania hupensis* or the two ordinary *mansoni* hosts, *Planorbis guadalupensis* and *P. Pfeifferi*. But those resulting from the union of male *japonicum* and female *mansoni* went on to the cercarial stage in *P. Pfeifferi* only, and even in it infection was rare and the cercariae themselves were, in form and behaviour, like the normal *mansoni* (i.e. the maternal species) and the adult worms from these had the characters of *S. mansoni*. Since the final product always "took after" the mother, the ova may have developed parthenogenetically, or the spermatozoa may have acted merely as a stimulus to development, without taking any part in the actual development (pseudogamy).

H. Harold Scott.

HALAWANI, A. The Effect of Gammexane on the Snails "*Planorbis*" and "*Bulinus*", the Intermediate Hosts of Schistosomiasis in Egypt. *J. Roy. Egyptian Med. Ass.* 1946, July-Aug., v. 29, Nos. 7/8, 197-206.

"1. It was found that in the laboratory and field experiments Gammexane in powder form is destructive to the snails (*Bulinus* and *Planorbis*) in a dilution of approximately 5-6 parts per million after 24 hours.

"2. It is believed that much lower dilutions are sufficient for eradication if applied for a longer time."

KUO, S. C. Further Studies on Distribution of Schistosomiasis Japonica in Szechwan Province, China. *J. Parasitology.* 1946, Aug., v. 32, No. 4, 367-8.

"1. Cases of schistosomiasis japonica are now known from eleven districts in Szechwan, a province formerly thought to have few cases of schistosomiasis.

"2. The presence of *Schistosoma japonicum* in the mesenteries of cattle coming from different districts indicates a wider range of distribution.

"3. A new subspecies of snail has been found to be capable of acting as intermediate host for *S. japonicum*.

"4. In addition to *S. japonicum*, *Ornithobilharzia turkestanicum* is common in the mesenteries of cattle of Szechwan."

FAUST, E. C. & INGALLS, J. W., with the assistance of J. K. SEE. The Diagnosis of Schistosomiasis Japonica. III. Techniques for the Recovery of the Eggs of *Schistosoma japonicum*. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 559-84. [11 refs.]

In light human infestations with *S. japonica*, whether primarily so or as a result of partially successful previous treatment, eggs of the worms may be so

scanty in the stools that they cannot be found by examination of simple cover-slip preparations of faecal material. A concentration technique must therefore be used for the human cases.

the recognized

fications in an endeavour to develop a technique yielding consistently satisfactory results. They record the details of their extensive experimental work in considerable detail and show how they improved their technique step by step as each modification was introduced after thorough testing. They end with the following conclusions and summary. —

(1) *Direct fecal films*. These should always first be made and examined in all cases suspected of having schistosomiasis japonica. Three to eight such films provide considerable evidence of the presence of *Schistosoma japonicum* eggs in the stool and are particularly useful in indicating the unequal distribution of the eggs in a stool specimen. Moreover direct fecal films are especially valuable for the examination of flecks of mucus with or without blood in which nests of eggs may be trapped.

as much 0.5 per cent glycerin in tapwater then poured through gauze (or wire screening) to exclude macroscopic fecal debris. Four layers of Curity surgical gauze have been found to be very satisfactory for this purpose and serve to strain out only a very small percentage of the total number of *S. japonicum* eggs in the specimen. A wetting agent aids the settling of the eggs. Dilute solutions of potassium hydroxide, iron alum, sodium sulphate and detergents all expedite sedimentation but they increase the bulk of the sediment and to that degree dilute the number of eggs per given volume of sediment. On the other hand 0.5 per cent glycerin in tapwater does not swell the sediment and provides a yield of *S. japonicum* eggs in a completely natural state and in the same proportion as they occur in the unprocessed stool. Two and one half to three hours after initiating sedimentation following three suspensions and decantations the final sediment may be sampled with the assurance that a very

unprocessed stool specimen

(3) *Zinc sulphate centrifugal floatation*. This technic is not satisfactory for recovery and diagnosis of *S. japonicum* eggs since only a small percentage of the eggs float. Whether they float or remain in the sediment they are shrunken and frequently constitute a diagnostic risk.

(4) *Ether centrifugalization*. The tests may be conducted with either an International clinical laboratory centrifuge or an angle centrifuge each carrying two or four 15 m gram sample of stool or genized in 5 ml of the a two layers of Curity surf equal volume of ether sh then centrifugalized at 1500 rpm for 2 minutes. The tube is removed from

agent
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liquid decanted. The small amount of sediment is then transferred to one or more microscopic slides as required and examined for eggs.

"Fifteen per cent. hydrochloric acid-ether provides a sediment which usually although not invariably gives a higher egg yield than several direct fecal films. The mechanical interaction between the HCl and ether during centrifugalization destroys or . . . times some of the mature viat . . . cularly Triton NE (0.06 ml. p . . . because it partially prevents their destruction. Hydrochloric acid (15 per cent.) + sodium sulphate (sp. gr. 1.08) half and half + Triton is distinctly better than hydrochloric acid + Triton, both in egg yield and in diagnostic quality. Sodium sulphate + Triton (without hydrochloric acid) is usually superior, because it provides all stages of the eggs in the sediment in the same proportion as in the unprocessed stool and with excellent preservation. When other reagents, as KOH, $ZnSO_4$, CHOH and the detergent Tween-80, are added to HCl or substituted for HCl, they may at times produce excellent concentration and fair to good diagnostic quality of eggs in the sediment, but they are not as consistently reliable as is HCl + Na_2SO_4 + Triton or Na_2SO_4 + Triton.

"(5) For recovery of the largest number of *S. japonicum* eggs in a small amount (one gram) of stool, the Na_2SO_4 + Triton-ether centrifugalization technic is the best one which has been developed. However, for routine stool examination, sedimentation utilizing 0.5 per cent. glycerin in water is recommended, because the larger amount of stool processed, together with the high concentration of *S. japonicum* eggs in the first three 0.1 milliliter samplings

of the sediment. Both the Na_2SO_4 + Triton NE-ether centrifugalization technic and sedimentation may be depended on to provide eggs of high diagnostic quality, including immature, mature, degenerate and calcified ones."

[This paper should be consulted in the original by those working on the subject.]

A. R. D. Adams.

BAROODY, B. J. & MOST, H. The relative Efficiency of Water Centrifugal Sedimentation and other Methods of Stool Examination for Diagnosis of Schistosomiasis Japonica. *J. Lab. & Clin. Med.* 1946, July, v. 31, No. 7, 815-23.

The authors present a modified water centrifugal sedimentation method of faeces examination which was found to be more efficient in detecting eggs of *S. japonicum* than other routine or special methods currently employed.

Ten to 15 grammes of faeces are shaken up for one to two minutes in a 125 cc. Erlenmeyer flask containing about 100 cc. of lukewarm tap water. The emulsion is strained through two layers of wet gauze into a 50 cc. centrifuge tube with a teated bottom, $4\frac{1}{2}$ in. long by 1 in. diameter, and spun for 30 seconds at 1,500 r.p.m. The supernatant fluid is decanted and tap water at 40°C. is added to the tube which is shaken up and spun again. This is repeated about 3 times or until the supernatant fluid is clear. Four drops of the sediment are then examined on a slide under a large cover slip, 22×40 mm. Two slides at least are examined. The total time required for the procedure is 20 to 25 minutes.

reagents and only a minimum amount of standard laboratory equipment. It was found to be more efficient than direct smear examination of stools which were free of easily visible bloody mucus; or than examination by the acid-

ether zinc sulphate or brine floatation methods. It is particularly useful for the detection of light asymptomatic infections and for the evaluation of the results of specific therapy.

J J C Buckley

MARTIN W B GRAZIANI J G COLLINS J & LINCICUM D R. Chronic Infestation with Intestinal Parasites in an Engineer Battalion with particular reference to *Schistosoma japonicum*. *Southern Med J* 1946 Nov v 39 No 11 883-8

In 206 soldiers of an engineering battalion who had been removed from the site of exposure for four months 19 cases of infection with *Schistosoma japonicum* were discovered. Exposure to infection had occurred over a period of five months during the autumn and winter 1944-1945. Seventy seven per cent were found to be infected with one or more pathogenic parasites only 3 per cent were found to be free from any intestinal parasite. A past history of prolonged fever with urticaria weakness diarrhoea and other abdominal symptoms was the most significant finding in cases of schistosomiasis. The presence of eosinophilia was only suggestive but no constant or significant changes were noted in the haemoglobin level erythrocyte count leucocyte count the sedimentation rate or plasma level.

Up to the present no serious departure from the normal in the cases of schistosomiasis has been revealed except for the possible significance of a high percentage of palpable livers so that the exact significance of the infection in relation to the future health of the patient can be ascertained solely by a prolonged follow up.

P Manson Bahr

GELLHORN A TUPIKOVA Natalia A & VAN DYKE H B. The Tissue-Distribution and Excretion of Four Organic Antimonials after Single or Repeated Administration to Normal Hamsters. *J Pharm & Exper Therap* 1946 June v 87 No 2 169-80 2 figs [13 refs]

This investigation deals with distribution and excretion in hamsters (*Cricetulus* [*Cricetus*] *auratus*) of two trivalent (tartar emetic and Anthiomaline) and two quinquevalent antimonials (Stibnanose and Neostibosan) twenty four hours

rhodamine-B method which has been evaluated by GELLHORN *et al* in the article preceding that now under review. It consists in digestion by strong H_2SO_4 and HNO_3 to destroy organic matter and a coloured complex is formed by the metal and dye in presence of excess chloride ion. The complex is then extracted with benzol and the optical density of the solution measured in a spectrophotometer at a selected wave-length and the amount of antimony present determined by comparison with a standard calibration curve prepared in the same way. In agreement with other workers it was found that much

compounds but valency was not the only determining factor. Only traces of Sb were found in the spleen after injection of trivalent compounds but with

pentavalent compounds the content was high. In both organs the Sb content was greater after Neostibosan than after Stibanose, although the amount of Sb injected in the case of the former was smaller. In other tissues only traces of Sb were found. The greater portion of pentavalent antimony was eliminated by the kidneys, and by the bowel—probably owing to secretion in the bile—in the case of the trivalent compounds. About 15 to 20 per cent. of the amount administered remained unaccounted for. Determinations similar to the above were made in the case of tartar emetic and Stibanose following daily injections of the same dose for seven days, the animals being sacrificed 24 hours after the last injection. Greater absolute values were found for antimony in the liver in this case, but relative to dosage there was no percentage increase. The results in the two series of experiments were otherwise comparable. The tissue content of Sb following daily injection of the four drugs, until death resulted, again showed that in spite of wide variations in Sb content, the liver was the chief site of localization and that there was relatively little present in other essential organs. An explanation of the greater toxicity of trivalent compounds was not forthcoming.

J. D. Fulton.

DONALDSON, A. W. & OTTO, G. F. Effects of Protein-Deficient Diets on Immunity to a Nematode (*Nippostrongylus muris*) Infection. *Amer. J. Hyg.* 1946, Nov., v. 44, No. 3, 384-400, 3 figs. [33 refs.]

ZIMMERMAN, H. M. Fatal Hookworm Disease in Infancy and Childhood on Guam. *Amer. J. Path.* 1946, Nov., v. 22, No. 6, 1081-99, 18 figs. on 4 pls.

An account of 21 cases.

LOUGHLIN, E. H. & STOLL, N. R. An Efficient Concentration Method (Aex) for detecting Helminthic Ova in Feces (Modification of the Telemann Technic). *Amer. J. Trop. Med.* 1946, July, v. 26, No. 4, 517-27. [15 refs.]

In most concentration methods, especially Lane's DCF, the majority of the infertile *Ascaris* eggs are lost. The acid-ether-xylol, or AEX technique, obviates this and certain other limitations of the recognized concentration methods. Advantages of the AEX are that a generous sample of stool is taken initially and yet the portion examined is relatively very small, so that the whole of it can be examined and a quantitative result obtained, and that xylol helps to reduce the adhesive properties of the coagulum and thereby saves the loss of many ova.

"The steps in AEX are as follows:

"1. Measure 4 ml. (or grams) of feces into a dilution counting flask which has been filled to the 56 ml. mark with water.

"2. Add several glass beads (6 mm.), and after giving the preparation an initial shaking, set aside for several hours or overnight (preferably refrigerate); complete the comminution of the feces by vigorous shaking, so that all the eggs are free.

"3. Shake to produce a thorough distribution of the eggs in the fecal suspension and transfer immediately 1.5 ml. of the suspension to a 15 ml. pointed centrifuge tube.

"4. Add 3.5 ml. of 20 per cent. hydrochloric acid [20 ml. concentrated acid diluted to 100 ml.], put a rubber stopper in the tube and shake for one minute; allow to stand for two minutes.

"5. Add 5 ml. of a freshly prepared mixture of equal parts ether and xylol and again shake for one minute.

"6. Centrifuge at 1800-2000 RPM for two minutes and allow the centrifuge to come to a stop gradually without interference.

7 Separate the semi floating coagulum from the walls of the tube with a thin wooden applicator

8 Decant quickly permitting the sediment in bottom of tube to remain undisturbed. Then while holding the tube almost horizontally clean any adhering coagulum from the inside of the tube with an applicator covered with gauze

9 Add one drop of 0.1% solution of sodium hydroxide to the sediment mix thoroughly with a capillary pipette transfer entire suspension to a glass slide and place a coverslip on it. If the density or amount of residue warrant it make two drops of the material and cover each with a coverslip in order to secure a preparation which will allow the eggs to be seen easily. We prefer a 1½ x 3 inch slide and a 22 x 30 mm or 25 mm square coverslip

10 Examine the whole preparation for eggs. Those found are from 0.1 gram. of the original fecal specimen

Practical tests involved two groups. In the first 100 consecutively received faecal specimens for general parasitological examination plus 34 sent specifically for examination for ova of *Schistosoma japonicum* were examined in the authors laboratory. The Telemann (40 per cent hydrochloric acid) and Lane's DCF techniques were used for comparison. Except that fertile *Ascaris* were recovered in 100 per cent of positive stools by all three methods the AEN proved superior with all helminth ova. In the case of *S. japonicum* the AEN revealed ova in 19 specimens whereas the Telemann revealed them in only one and the DCF in none. The AEN alone revealed infertile *Ascaris* ova in 13 specimens. Of 15 specimens in which the AEN revealed *Trichuris* ova the Telemann revealed ova in 8 and the DCF in 11.

The second field test was carried out in Okinawa where 200 consecutive stools of natives were examined. There were 14 hookworm, 10 fertile *Ascaris*, 4 infertile *Ascaris* and 20 *Trichuris* infections revealed by AEN that were

In stools with egg-counts of 1/100 eggs or more by the AEN method and in those with 0 per cent of *Trichuris* and fertile *Ascaris* ova infections and 67 per cent of infertile *Ascaris* infections were revealed by this method.

L. E. Napier

BLACK, T. C. Coexistent Hookworm and Tuberculosis. *Southern Med J* 1946 Nov, 39 No 11 881-4 15 refs

Hookworm infection remains a major public health problem in Florida. During six years stool examinations on 1,170 admissions to the Florida State Tuberculosis Sanatorium were carried out. The hookworm infection rate was 10.45 per cent for white males and 6.06 per cent for white females or 8.48 per cent for the whole white group. For the negroes it was only 4.44 per cent.

Among 711 patients discharged during the six years 60 had hookworm infection. Seventy-three and three-tenths per cent of the hookworm positive patients discharged were classified as improved or better compared with 75.7 per cent amongst the hookworm free patients. However if sputum positive (tubercle bacilli) cases only are considered the figures are 63.4 per cent with hookworm and 70.5 per cent without hookworm.

The hookworm infections were subclinical in most instances but a few patients were anaemic and there is a definite difference between those with haemoglobin above and below 80 per cent. Of the former 78.9 per cent were discharged as improved or better compared with 59.0 per cent of the latter.

Only 22 of 84 hookworm-positive white patients had haemoptysis. This does not indicate any effect on the lungs from migratory larvae, nor was there any evidence that they produced shadows on the chest films.

There are thus two slightly unfavourable prognostic trends revealed, namely, hookworm infection in patients with tubercle bacilli in their sputa, and hookworm infection associated with anaemia in tuberculosis. L. E. Napier.

WATSON, J. M. The Differential Diagnosis of Hookworm, *Strongyloides* and *Trichostrongylus* with special reference to Mixed Infestations. *J. Trop. Med. & Hyg.* 1946, Oct.-Nov., v. 49, No. 5, 94-8, 1 fig. [20 refs.]

Diagnosis of hookworm or *Strongyloides* infections by microscopical examination of faeces is not difficult since, normally, eggs only of hookworm and larvae only of *Strongyloides* are encountered. In double infection with these helminths any doubts as to their identity can be resolved by culturing the faeces, when hookworm eggs, if present, will develop to rhabditiform larvae in 48 hours at 25°C. and *Strongyloides* larvae will have developed into fourth-stage adults. In the stool...

smaller than hookworm eggs, measuring 50-58×30-34μ. Rhabditiform larvae of doubtful identity in old or constipated stools may be recognized as those of *Strongyloides* by the short buccal capsule and rather stumpy tail and of hookworm by the long buccal capsule and more attenuated tail. The infective larva of *Ancylostoma* differs from that of *Necator* in the length of the buccal spears and the appearance of an intervening space between oesophagus and midgut in *Necator*.

Eggs of *Trichostrongylus* differ from those of hookworm in size and appearance. They are larger than hookworm eggs, are more sharply pointed at one end, have a larger number of blastomeres and in fresh specimens have a greenish tinge. First-stage larvae of *Trichostrongylus* have a dorsal bend at the level of the anus and the tail terminates in a minute knob. J. J. C. Buckley.

LOPEZ-CHAVEZ, G. J. Frecuencia, diagnostico y tratamiento del *Strongyloides stercoralis*. [Frequency, Diagnosis and Treatment of *Strongyloides stercoralis*.] *Rev. Méd.-Quirúrg. de Oriente*. 1946, Sept., v. 7, No. 3, 159-66.

BAZ, I. I. Distribution of Filariasis in Egypt. *J. Roy. Egyptian Med. Ass.* 1946, July-Aug., v. 29, Nos. 7/8, 280-87. [12 refs.]

NEWTON, W. L. & PRATT, I. Experiments to determine Potential Mosquito Vectors of *Wuchereria bancrofti* in the Continental United States. Part 2. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 699-706.

The first part of this work was summarized in this *Bulletin*, 1946, v. 43, 52. The present authors have continued the investigation and have used 9,122 mosquitoes of 16 species; 2,087 of them, belonging to 14 species, took a blood meal during 225 feeding attempts. The results of 1,314 dissections are tabulated and discussed; they show that in susceptible species the infective stage in the development of *Wuchereria bancrofti* was reached usually within two weeks but in *Psorophora discolor* it required 5 to 7 days longer.

Culex restuans and *Orthopodomyia* sp. did not feed. *Anopheles quadrimaculatus*, *A. maculipennis freeborni* and *Psorophora ciliata* are incapable of transmitting infection as there was no development beyond the first stage. There were only a few dissections of *Psorophora ferox* and *P. howardii* and these were negative. *Aedes canadensis*, *Mansonia perturbans* and *Psorophora*

cyaneus are apparently not not completed *Culex salinar* be occasional vectors but the Studies are not yet complete on *Culex erraticus* but it might be a vector to a minor extent *Culex pipiens* and *Psorophora discolor* are definitely capable of transmitting infection given suitable conditions the former had a total infectibility rate of 91 per cent and the latter of 67 per cent H S Leeson

BERCOVITZ Z T & SHWACHMAN H Filarial Survey among Young Puerto Ricans. *Puerto Rico J Pub Health & Trop Med* 1946 Sept v 22 No 1 66-81 1 chart & 2 maps on 3 pls [Spanish version 82-94]

A total of 16 439 young Puerto Ricans between the ages of 18-38 years were examined for circulating microfilariae by the use of a thick drop of blood collected at night (9.30 p.m.) The amount was approximately 20 cmm of blood dehaemoglobinized and stained with Delafield's haematoxylin. A total of 3.42 per cent were positive for microfilariae of *W. bancrofti*.

With the exception of one reported case of *Mansonella ozzardi* found by HOFFMAN *et al* [this Bulletin 1932 v 29 768] in a patient who had always lived in Vieques an island lying off the eastern coast this is the only species of filaria in Porto Rico.

Among 460 individuals who were positive only 11 gave a clinical history consistent with filarial disease but there was no correlation between the numbers of circulating microfilariae and the history of symptoms of clinical filariasis. The highest eosinophilia averaged 39 per cent in a person with hookworm whipworm and ascariis and the highest microfilarial count was 396 per 20 cmm of blood of eosinophilia the number types of intestinal parasites varied from 1 to 396 per 20 cmm 47.4 per cent had 15 or less microfilariae per 20 cmm.

The percentage of positive findings were recorded for different age-groups in 8 029 persons. There was a decline from 5.03 per cent in the 18 to 20-year age-group to 0.92 per cent in the 36 to 38-year age-group.

[For the geographical distribution and percentage of Porto Ricans with microfilariae for 76 localities in Porto Rico and in the Vieques the original paper must be consulted as being of local interest.] P Manson Bahr

BROWN H W & THETFORD N D Further Studies on the Treatment of Filariasis due to *Wuchereria bancrofti* with Lithium Antimony Thiomalate. *Amer J Hyg* 1946 Nov v 44 No 3 379-83

In 1944 one of the authors reported on the early effects of treatment of filariasis by intramuscular injections of lithium antimony thiomalate [see this Bulletin 1945 v 42 53] they now report on the results of observation of these patients for a period of two years.

The patients were natives of St. Croix Virgin Islands an endemic area

reduction in microfilariae of 90 per cent or more and in four of these the

microfilariae had completely disappeared by the end of the 12th or 24th month; the rest showed an appreciable reduction in microfilariae. Among 17 patients who were treated with the Merck's preparation of this drug, three showed complete clearance of microfilariae.

The authors do not consider that there is any difference in efficacy of the two preparations: the French drug was possibly more toxic, but the samples used were at least five years old, and it is suggested that this might account for the greater toxicity.

None of the patients suffered at any time from severe local reactions as a result of the deaths of the adult worms in their tissues.

A study of plasma-antimony levels did not suggest that there was any difference in the rate of excretion of antimony between those who did and those who did not respond well to treatment.

L. E. Napier.

PEEL, E. & CHARDOME, M. Sur des filarides de Chimpanzés "*Pan paniscus*" et "*Pan satyrus*" au Congo belge. [Filarial Worms in Chimpanzees, *P. paniscus* and *P. satyrus* in the Belgian Congo.] *Ann. Soc. Belge de Méd. Trop.* 1946, June 30, v. 26, No. 2, 117-56, 23 pls. [23 refs.]

This account of the finding of adult filarial worms and microfilariae in chimpanzees is an interesting and important contribution to present knowledge of certain filarial infections in man.

Microfilaria streptocerca, first found by MACFIE and CORSON in 1922 in the skin of Gold Coast natives, is here recorded from the skin of six out of 11 chimpanzees (*Pan paniscus* and *P. satyrus*) in Belgian Congo. Prolonged search for the parent worms yielded two adult females and a fragment of another, in the connective tissue of the skin of *P. paniscus*. These are described in detail and assigned to the genus *Dipetalonema* Diesing, 1861. The relationship between the parent worms and the microfilariae is established by a comparative study of microfilariae from three sources, the uteri of the adult worms and human and anthropoid skin.

Dipetalonema vanhoofti n. sp. was discovered in fibrous nodules situated in the aponeuroses of the gall bladder and in the investing membranes of the *vena descendens* of chimpanzees. The nodules usually contained a female and two males and were surrounded by a fibrous exudate. Previously the authors had found a single adult female between the mesenteric folds and a fragment of a male on the pancreas. The new species resembles *D. perstans* closely but differs from it chiefly in its smaller size, the greater distance of the genital pore from the anterior end in the female, the smaller spicules and the greater number of adanal papillae (seven pairs) in the male. *Mf. vanhoofti* occurred in the blood and resembles *Mf. perstans* closely. The authors believe that previous records of *Mf. perstans* in the blood of anthropoids are in reality referable to *Mf. vanhoofti*.

In addition to *Mf. streptocerca*, two other species were found in the skin of chimpanzees, *Mf. rodhaini*, n. sp., and *Mf. binucleata*, n. sp.

Mf. rodhaini is characterized mainly by its great length and small width, which average 329-8 μ and 2-48 μ (maximum mean) respectively. In some specimens, instead of a single excretory cell, there are three special cells posterior to the excretory pore. A fragment of an adult female worm having a sharply pointed tail, was also found in the skin. As this was not referable to *D. perstans* or *D. streptocerca*, it is suggested it may be the parent form of *Mf. rodhaini*.

Mf. binucleata, like the previous species, is sheathless and is characterized by the fact that the anterior and posterior parts are about the same width and by a double body nucleus near the tip of the tail.

J. J. C. Buckley.

RODHAIN, J. Corollaire à l'étude de E PEEL et M CHARDOME sur les
 W. Chardome's
 Ann Soc.

In the light of the recent discoveries of PEEL and CHARDOME (see previous

DEFICIENCY DISEASES

O'DONNELL, J E Painful-Foot Syndrome. [Correspondence] *Brit Med J.*
 1946, Nov 9, 709

The author, a Major in the I M S, refers to PAGE's article [this *Bulletin*, 1946, v. 43, 1060] When the Dutch East Indies capitulated in March 1942, some 3,500 Allied prisoners, mostly British, were interned in Tandjoeng Priok, Java. In July, the painful-feet syndrome developed and three months later there were some 1,000 cases in the camp. The clinical features corresponded with those described by Page, except for the absence of gangrene, attributed by the author possibly to the warm climate

green pea)

Later, a crude liver extract was obtained from outside sources for the treatment of "blurred vision" It was of no apparent value in this complaint, but it greatly improved, and sometimes cured, the condition in patients who also suffered from painful feet

The quantity of this product was limited, but 2 cc were injected intramus-

MONTEIRO, A M, COUTINHO, H, JANZ, G J. & DE LOUREIRO, J. A Endemic Pellagra in Northern Portugal. *J Hygiene* 1946, Sept, v. 44, No 6, 518-25. [33 refs]

Pellagra is endemic among the peasants of Northern Portugal whose diet

slight and inconstant. Frank psychoses were not found, but most patients were depressed and irritable. There was a tendency for the blood pressure to be raised.

On treatment with nicotinamide (0.5-1.0 g. daily), the dermatitis disappeared; the reflexes, if they had been altered, became normal; and the mental and digestive symptoms were relieved. In some cases there was a fall in blood pressure.

Examination of the blood showed a moderate degree of anaemia, with a tendency to macrocytosis. The concentrations of protein, calcium, phosphorus, carotene, and vitamin A were within normal limits. The nicotinic acid excretion was measured in a number of samples of urine chosen at random, and was found to be low.

The diet was investigated in some detail in 18 families, comprising 86 people, of whom 33 were pellagrins. The average intake per day was calories 3,000 (70 per cent. from carbohydrate); protein 81 gm. (70 gm. from vegetable sources); nicotinic acid 11.73 mgm. The supply of calcium, phosphorus and iron was adequate. The intake of vitamins A, B₁, B₂ and C was slightly below the optimal requirement.

In discussing their findings, the authors point out that they are dealing with a form of pellagra which is mild, chronic, and pure, since it is not associated with evidence of riboflavin or vitamin B₁ deficiency. The question arises: why should pellagra occur on a diet which is not very low in nicotinic acid? The recognized requirement is 15-20 mgm. a day, and the average intake in the population investigated was nearly 12 mgm. daily. It is suggested that the requirement of nicotinic acid is:

and more specifically b
phane and lysine. While maize is high in calories and total protein, but deficient in animal protein, maize has a special effect in producing pellagra; on a low calorie and low total protein intake, pellagra may occur on any vegetarian diet.

[The problem of why pellagra is associated with low protein intake is solved by the work of AYKROYD and others, who have shown that the maize diet is deficient in tryptophane and lysine.]

Maize, which is high in calories, contained more nicotinic acid than the poor rice diet of India, where pellagra is uncommon. Therefore attention has again been directed to the old toxic theory on the one hand, and to the possibility of an amino-acid deficiency on the other, since it has long been known that maize protein is deficient in tryptophane and lysine. Recent findings throw new light on these relationships, though they do not explain them. KREHL *et al.* [*Science*, 1945, Mar. 16, 283] showed that the inclusion of maize in a low protein diet for rats caused a retardation of growth, which was prevented by tryptophane or nicotinic acid. WOOLLEY [*J. Biol. Chem.*, 1945, v. 157, 455; *ibid.*, v. 162, 179] found that 3-acetylpyridine, the ketone analogue of nicotinic acid, had a toxic effect on mice, which was prevented by both nicotinamide and by tryptophane. He also succeeded in extracting from maize a substance which causes a pellagra-like syndrome in mice—failure of growth, dermatitis, and inflammation of the skin and tongue.

[WOOLLEY, this *Bulletin*, 1947, v. 44, 119] suggested that the pellagragenic agent in maize is indole-3-acetic acid, a substance which can be formed by the oxidative deamination of tryptophane. This adds interest to the observation of WATSON [*Proc. Soc. Exper. Biol. & Med.*, 1939, v. 41, 501] that the maize diet is deficient in tryptophane.

We are on the verge of new developments in our knowledge of pellagra. The paper from Portugal is a useful reminder that the last word has not been said with the discovery of nicotinic acid.] J. C. Waterlow.

YUDKIN J Riboflavin Deficiency in the West African Soldier *J Trop Med & Hyg* 1946 Oct-Nov v 49 No 5 83-7

In 1945 an investigation was made into the condition of some 1 050 West

with yeast tablets compound vitamin tablets or pure riboflavin caused a rapid improvement in scrotal dermatitis in nearly all cases When 9 mgm 4 days The

ration scale

One of the main sources of riboflavin was millet which is not normally eaten by Africans in Sierra Leone Questioning showed that millet was very unpopular among the troops and that not more than one fifth of the amount supplied was in fact consumed Therefore though the ration scale theoretically provided 1.5 mgm of riboflavin per day the actual intake was estimated at only 0.8 mgm The author emphasizes the importance of taking local food habits into account in the planning of ration scales *J C Waterlow*

CHAUDRON J Avitaminoses dans un corps de troupe colonial [Avitaminosis in Colonial Troops] *Méd Trop* Marseilles 1945 July-Aug-Sept v 5 No 3 228-36

The urinary elimination of bisulphite binding substances (BBS) was measured in a number of French Colonial and European troops High values were found both in apparently normal subjects and in a small number of patients with complaints ranging from a wound which would not heal to hepatic asthenia It is considered that the unit as a whole was suffering from vitamin B₁ deficiency overt or subclinical The men were subsisting on American Army rations supplemented by bread and wine and later by fresh fruit and dairy products *J C Waterlow*

HAEMATOLOGY

LEAVIS Hetty Haematological Standards in Southern Rhodesia a Survey of 100 White School Girls *South African Med J* 1946 Nov 23 v 20 No 22 715-18

DAVIDSON L S P & GIRDWOOD R H Folic Acid in the Treatment of Megaloblastic Anaemia *Lancet* 1946 Sept 14 373-6

normoblastic state, and the clinical condition of the patients improved coincidently. The maintenance dose has yet to be settled.

Three cases of refractory megaloblastic anaemia, not responding to parenteral liver therapy but responding to proteolysed liver given by mouth, were also treated with folic acid by mouth in doses up to 20 mgm. daily. In each case,

and in two of the cases, proteolysed liver by mouth caused a further rise in red cells subsequent to folic-acid therapy. Since megaloblastic anaemias, refractory to anabaemin, respond to both proteolysed liver and to folic acid it might be thought that folic acid is the active principle in proteolysed liver, but as proteolysed liver produced a further response after folic acid had ceased to be effective, it is suggested that in liver and proteolysed liver there exists some as yet undiscovered anti-anaemic principle additional to the specific anti-anaemic factor in anabaemin, and to folic acid.

F. Murgatroyd.

BONNIN, H., DUBOURG, E. & MORETTI, G. F. Acide folique et anémie pernicieuse. [Folic Acid and Pernicious Anaemia.] *J. Méd. de Bordeaux*, 1946, Oct., v. 123, Nos. 19/20, 361-6. [20 refs.]

The following is a translation of the authors' summary.

The authors record a case of pernicious anaemia treated successfully with folic acid. Following a detailed study of haemograms and marrow-pictures, the authors present a commentary in which, after discussing the main American

development, in the first place responsive to cure by yeast or folic acid and "réversible", and later strictly liver-curable and "irréversible", the disease recurring after treatment ceases.

H. J. O'D. Burke-Gaffney.

STRANSKY, E. & REGALA, A. C. New Type of Familial Congenital Chronic Hemolytic Anemia. *Amer. J. Dis. Children*, 1946, May, v. 71, No. 5, 492-505. [Refs. in footnotes.]

Four years ago the authors published a paper on erythroblastic anaemia following splenectomy in cases of chronic familial haemolytic anaemia; they believed that they were dealing with an hitherto undescribed clinical condition. One of the patients was a child belonging to a family of five children of whom four were subsequently found to be affected by a similar anaemia; in contrast to ordinary cases of chronic familial haemolytic anaemia, striking features were the erythroblastosis and the severe degree of illness shown by the children.

They have now observed 10 cases of this new type of haemolytic anaemia among Filipinos, but none among white people. It seems to be an inherited, congenital disease, affecting both sexes, unlike the elliptocytic anaemia of Cooley. Anaemia, jaundice and splenomegaly develop in early infancy. The peripheral blood is characterized by severe anaemia, oligocythaemia, oligochromia, extreme anisocytosis and polychromasia. There is neither spherocytosis nor formation of target cells, and the fragility of the red cells is invariably normal. Erythroblastosis is a conspicuous sign; in the peripheral blood it is constantly observed, although the number of erythroblasts seems to be moderate. The

differential count shows a shift to the left of the neutrophils myelocytes sometimes myeloblasts and promyelocytes are present in the majority of cases The serum icterus index is slightly increased between 10 and 20 units and the bilirubin is around 1.5 to 2 mgm per 100 cc Jaundice is present constantly more prominent during the frequent haemolytic crises erythroblasts in the bone of the red cells contrasting aemia in which although ferent stages of maturation consequently the reticulocyte count may

erythroblastosis develops immediately and numbering 50 000 to 200 000 have been constantly counted in the peripheral blood although the reticulocyte count has not corresponded to this high count of nucleated red cells Anisocytosis and polychromasia grow worse after erythrocytes with extreme anisocytosis develops that in this disease the spleen has the red cells in the bone marrow persons subjected to splenectomy F Murgalroyd

FAWDRY A L Cooley's Anaemia Notes on Six Adult Cases *Trans Roy Soc Trop Med & Hyg* 1946 Aug 40 No 1 87-91 1 chart

The fatal familial anaemia described by Cooley is the most serious form of a disease of varying severity transmitted as a Mendelian dominant by less severely Examples of the disease include continuous gradations

order obvious only by dual Harbours the trait is of no consequence to the individual but the potential repercussions on his offspring are obvious with the condition unrecognized to adult age but the potential repercussions on his offspring are obvious

The haematological features signalling the trait in healthy relatives of the degree of anisocytosis and poikilocytosis out of proportion

abnormally thin cells with a deficient haemoglobin content the disorder is most strikingly shown by plotting the fragility curve F Murgalroyd

FINDLAY G M ROBERTSON W M & ZACHARIAS F J The Incidence of Sicklaemia in West Africa *Trans Roy Soc Trop Med & Hyg* 1946 Aug 40 No 1 83-6 [14 refs]

The incidence of the sickle cell trait among 500 Africans whose blood was examined after 24 hours at room temperature in vaseline sealed cover glass

preparations, was found to be 12.4 per cent. Just over half the subjects were from the Gold Coast and French Togo, the remainder coming from Gambia, Sierra Leone and Nigeria, where southern tribes, persons from the Plateau and

and 12.6 per cent. in females; but differences were observed in relation to age suggesting that the expectation of life in sicklers may be less than in normal persons. Among pregnant women the incidence of the trait was 16.9 per cent., while among sterile women it was 21.3 per cent. Observations to determine whether the jaundice seen in negroes suffering from pneumonia could be correlated with the sickle cell trait revealed no statistically significant difference between patients with and those without jaundice. Similarly no correlation was observed between the sickling trait and the presence of tropical ulcers of the leg.

No case of the sickle cell trait was found among 568 British soldiers and airmen, temporarily stationed in West Africa, nor among 188 Syrians.

F. Murgatroyd.

DERMATOLOGY AND FUNGUS DISEASES.

DUFFNER, G. J. Heat Rash as a Problem In the Naval Service. *Amer. J. Trop. Med.* 1946, July, v. 26, No. 4, 539-41.

This paper records an investigation concerning prickly heat which was made at the U.S. Naval Medical Research Institute. Ten volunteers constituted the "Hot Group"; they worked for seven hours each day in a room maintained at 108°F., dry bulb, and 83°F., wet bulb, and spent the remaining 17 hours in another room maintained at 95°F., dry bulb, and 83°F., wet bulb. The work they performed was walking on a treadmill. A similar group of volunteers—the "Cool Group" worked for seven hours a day in the hot treadmill room, but spent the remaining 17 hours in an environment of 85°F. dry bulb and 71°F. wet bulb. The experiment lasted for 10 days.

All the members of the "Hot Group" developed heat rash, some 39 per cent. of the skin surface of each person being involved. Only one person in the "Cool Group" developed the rash, and only 15 per cent. of the body surface was affected.

In a second experiment, 12 seamen, all 18 years of age, were divided into "Hot" and "Cool" groups. Three rooms were used, for the first eight days the rooms were cool (80°F. dry bulb, and 70°F., wet bulb). On the ninth day, the treadmill room was raised to the same temperature as in the first experiment; in the second room, occupied by the "Hot Group" when not working, the temperature was maintained at 90°F., dry bulb, and 85°F., wet bulb; in the third room, which the "Cool Group" used, the original temperature was maintained. The "Hot Group" worked the treadmill for three hours daily. The "Cool Group" worked the treadmill for a similar period, spent nine hours daily in the hot quarters, and then retired to the coolest room for 12 hours. The experiment continued for 30 days. All but one person in the "Hot Group" developed heat rash.

In further experiments, persons were exposed continuously to a temperature of 97.8° dry bulb and 86° wet bulb; the eruption developed suddenly on the third day of the experiment.

The investigators conclude that if a person spends 12 hours a day in an atmosphere "in which one does not sweat at rest" miliaria will not develop.

March 1947

They found no correlation between the pH of the sweat sweating rates or complexion and the incidence or severity of the rash Exposure to ultra violet rays ameliorated the symptoms in some cases but in others increased their severity

The histo-pathology of the affected skin was as follows—hyperplastic epidermis vesicle formation in the *stratum lucidum* not related to the sweat glands or hair follicles and oedema of the corium The dermis gave every indication of a dermatitis and some of the inflammatory cells infiltrated the epidermis

R W B Mackenna

SIMONS R D G P Dermatoses in tropen krijgsgevangenschap (Dermatoses in Tropical Prisoners Camps) Reprinted from *Nederl Tijdschr v Geneesk* 1946 Apr 20 v 90 No 16 351-5

Prisoner of war camps under the Japanese in Java and Sumatra were as notorious as those elsewhere in the Far East for their overcrowding insanitation underfeeding and maltreatment The author was the head of the Rapu military hospital and Red Cross Clinic Batavia He treats his subject after an indication of the dietary on which his patients had to subsist from April 1942 to September 1945 under specific heads—

(1) *Artificial dermatoses* These were artefacts produced by the guards of the prisoners forced holding out cigarette ends (2) *Scabies* The and stomatitis from putting on the legs or face with loss of teeth multiple burns from putting on the penis but not so often between the fingers Failure to recognize scabies accounted for many of the diagnoses were those dermatoses which are regarded as often being related causally to nervous shock namely alopecia areata and lichen ruber (3) *Scabies* The chief sites were the wrist the elbow and the penis but not so often between the fingers Failure to recognize scabies accounted for many of the diagnoses pruritus due to vitamin or calcium deficiency Pruritus in fact cannot be scabies or pediculosis (4) *Prodermia* as might be expected in the form of furunculosis etc was common (5) *Tropical ulcer* The phagedenic ulcer rarely occurred in the camp at Bandoeng but was common in Sumatra where invalids and shoeless persons had to work and wash in contaminated water Treatment was by pure phenol or iodoform (6) *Ringworm* Epidermophyton infection of the foot (athletic foot) and other tinea infections were frequent occurrence Syccosis barbae is a rare condition in the Netherlands Indies and was not seen among the prisoners of war (7) *Erysipeloid* Under this name is described a painful acute feeting epidemic condition beginning on the shin or instep of some 2 to 6 weeks duration with slight fever It may belong to the group erythema multiforme (8) *Pellagra* in all its varied forms was moderately frequent The author holds definite views on this variability and considers pellagra to be a poly if not an omni-deficiency by no means restricted to the particular deficiency involved and pellagra syndrome varies according to the particular deficiency involved and one should not rely rigidly on the old fashioned triad dermatosis diarrhoea and depression (ultimately dementia) The depression may be incidental and dementia patients may also suffer from pellagra—widespread erythema be dealing with a vicious cycle underfeeding—pellagra—Thrombocytopenia—underfeeding—hyperkeratosis Thrombocytopenia is a noteworthy feature and is independent of sunlight erythema it can occur along the whole course of the alimentary tract [Brit Med J 1946 Nov 30 817] (9) Other dermatoses dealt with are psoriasis which became mild because of the diet and a few cases of herpes zoster leprosy and what is called the short lived skin hobby of tattooing in which the word mother was the most popular pattern

H F Harvey

MIESCHER, G. Penicillin in der Dermatologie. [Penicillin: Its Use in Dermatology.] Praxis. Berne. 1946, Dec. 23, v. 35, Nos. 51/52, 869-75. [22 refs.]

Owing to the sudden rise in the popularity of penicillin and the varying reports on its success or failure, the time has come, says the author, to take stock of its value in diseases of the skin. If we bear in mind the variable susceptibility to the drug of different strains of the same species of organism, *Staphylococcus* for example, we shall find a solution, in part at least, for what is otherwise puzzling—that some staphylococcal and streptococcal cutaneous affections react well to it, while others are quite unresponsive.

In *furunculosis* and in *carbuncle* the results have been disappointing; in a few cases there seemed to be some benefit, but it was not great and was not sustained. In *syosis* again the results were variable. Of 7 cases referred to, two were cured by a three-day course, another relapsed within 3 weeks, but was healed by a second course, four showed improvement but were not cured. The dose given was 100,000 Oxford units on each of two successive days. In cases of *sudaminal abscess* 100,000 units daily were given. Of nine such, in 3 the collections softened and broke down, in 4 resolute breaking down, 2 were completely unaffected; treated with penicillin; 4 were cured, but 3 improved but were not cured until other forms of treatment were substituted. Unexpectedly rapid success followed its use in patients with *staphylococcal follicular dermatitis*, a local spray was used and also intramuscular injections of 100,000 units for adults and 50,000 for children, for 1-3 days. In *impetiginous eczema* again the results varied; healing might result from large doses and prolonged use, up to one million units. Lower dosage, up to 400,000 units brought about improvement. In most cases the eczema, on which the pyodermic state had been, as it were, grafted, remained. Penicillin was tried in cases of *ulcer of the leg*, usually of vascular origin. Most of these were unaffected; some showed a little amelioration at the start, but this was not maintained and, it was negligible. As regards *eczema*, in view of the *ia*, allergy, etc., uniform results could hardly be and irritation might subside and staphylococci diminish, but only a few cases were healed by the penicillin. It proved best in *impetigo* and "weeping" *eczemas*, because in these the staphylococci are a main complicating factor.

To sum up: In staphylococcal affections of the skin, penicillin is a valuable addition to the medical armamentarium. In streptococcal infections it is better to combine the penicillin with one or other of the sulphonamide drugs.

H. Harold Scott.

SEWELL, S. A. Insulin Therapy In Acne Vulgaris in Tropics. *J. Roy. Nav. Med. Serv.* 1946, July, v. 32, No. 3, 185-6.

Acne vulgaris in the adolescent male can be very troublesome under service conditions, especially in the tropics. In 1940, the author treated six cases of indurated acne by the injection of 10 units of insulin every morning and afternoon (6 a.m. and 4 p.m.); the usual local measures were used concurrently; one case did not improve; in the remainder "the inflammatory reaction disappeared" and no further lesions appeared during the next four months.

In 1942 a further series of eight cases were similarly treated with satisfactory results; residual comedoes were expressed and then 2 per cent. sulphur and salicylic acid ointment was applied. One of these patients is known to have required further treatment two years later.

by the insulin
chronic cases
in two cases

their inflammatory lesions subsided but comedo formation persisted.

In 1944 and 1945 fourteen men were treated with insulin on board ship in the tropics. Concurrent local therapy was not given, except that pus was drained from some indolent lesions. In 12 cases improvement occurred rapidly,

had had a further exacerbation, which responded within three weeks to insulin therapy

The author does not advocate treatment with insulin as being a cure for acne, but he recommends res a remission of the high he advocates (10 is of mild degrees of

hypoglycaemia were noted only in a few instances and were easily relieved by small doses of cane sugar

R M B MacKenna

JOLLY, A T H The Effect of Intravenously administered Antimony Compounds on Pyogenic Skin Lesions. *Med J Australia* 1946, Nov 2, v 2, No 18, 630-34

- " 1 Thirty five cases of suppurative skin lesions and one of an oral lesion treated by the intravenous administration of antimony preparations are cited
- " 2 The follicular type of lesion appears to respond to antimony therapy
- " 3 Antimony is known to have an affinity for keratin
- " 4 The one mucous membrane lesion cited failed to respond to antimony
- " 5 The commonest organism found in the lesions was the staphylococcus "

BERESTON, E S & CHENEY G Vitamin B Complex in the Treatment of Lichenoid Dermatitis *Arch Dermat & Syph* 1946 Oct, v 54, No 4, 425-31

" 1 The time of recovery from lichenoid dermatitis is shortened by the administration of vitamin B complex in large doses in addition to routine dermatologic care. This improvement occurs in patients with moderate and mild eruptions but not in those with severe ones

" 2 Vitamin B complex deficiency is a factor, probably secondary, in causing lichenoid dermatitis

" 3 The fraction or fractions of the vitamin B complex group which are responsible for the more rapid recovery are yet to be determined "

POPOV, I S [Questions of Mycology.] *Trudy V'seukrainskogo Gosudarstvennogo Instituta Venereologii i Dermatologii* Kharkov 1934, v 5, 133 pp, 24 figs [In Russian]

This publication deals partly with work in mycology carried out at the Ukrainian Institute of Venereology and Dermatology between 1931 and 1933, and partly with a review of mycological literature published in the Soviet Union and in other countries from 1928 to 1933. The work contains the following six articles: (1) "Organization of a campaign against mycoses in the Ukraine", (2) "Fungus diseases based on materials of the Institute for

1931-1933"; (3) "The clinical course, etiology and therapy of dyshydromorphic and intertriginous mycoses"; (4) "The rôle of pathogenic fungi in the etiology of infectious epidermophytoses"; (5) "Mycological and clinical characteristics of dermatomycoses, and their peculiarities"; (6) "Summary of recent achievements in mycology."
C. A. Hoare.

SHARP, W. B. & JOHN, Mildred B. Pathogenicity of the *Aspergilli* of Otomycosis. *Texas Reports on Biol. & Med.* 1946, v. 4, No. 3, 353-63. [12 refs.]

"1. The fungi associated with otomycosis are of common saprophytic species that abound on the normal skin and in the dust of the air.

"2. The lesion does not harbor indiscriminately all fungi to which the body is exposed, but favors *A. niger*, *A. flavus* and occasional others. We did not learn the nature of the selective factor.

"3. We found little reason to think that a susceptibility of the tissue to attack by these particular fungi was what accounted for their thriving so well in the lesion.

"4. Strains of these fungi which were associated with the disease failed to show properties unshared by other strains of the same species. Otomycosis strains did not form a more toxic group, nor a group distinguishable from other strains of the species by antigenic characteristics."

MESROBEANU, Lydia. Contribution à l'étude de la structure antigénique des "Monillas". [Study of the Antigenic Structure of "Monillas".] *Arch. Roumaines Path. Expér. et Microbiol.* 1943, Jan.-Dec., v. 13, Nos. 1/2, 123-32. [12 refs.]

GONÇALVES, A. P. Associação de blastomicose brasileira e tuberculose em lesões ganglionares. [Association of Brazilian Blastomycosis and Tuberculosis in Lymph Nodes.] *Rev. Brasileira Med.* Rio de Janeiro. 1946, July, v. 3, No. 7, 525-33, 10 figs [Summary in English by the author.]

"1. Brazilian blastomycosis and tuberculosis can exist associated in lesions of the lymph nodes. 2. These observations raise to 3 the number of known cases of this association: the first, of Oscar Versiani; and the two others [that it has] just reported. 3. In a patient with a diagnosis of Brazilian blastomycosis, the complementary examination that provides the greatest assurance of detecting the association of the mycosis with tuberculosis in the lymph nodes is the inoculation into guinea pigs. 4. In these cases of lymphadenitic Brazilian blastomycosis where the sulfonamides known as effective in this infection have failed to produce the usual curative results, the possibility of an associated tuberculosis must be suspected and inoculation into guinea pigs should be resorted to. 5. Tubercle bacilli can determine a local ambient unfavorable to the development of *Paracoccidioides brasiliensis*, when they are both present in the same lesions."

BOBILLO, L. Granuloma apical (dentário) por "Paracoccidioides brasilienses" (Splendore), Almeida 1929. [Apical (Dental) Granuloma caused by *Paracoccidioides brasiliensis*.] *Brasil-Médico.* 1946, Oct. 19 & 26, v. 60, Nos. 42/43, 341-2.

Report of a case.

and who was having sixty bloody motions daily, the patient improved remarkably and the ileostomy was closed two years later. After some time, painful feet became very troublesome, an affected foot being pinkish blue, sweating freely, with marked arterial pulsation and severe nocturnal aching pain. At that time the diet was particularly deficient in protein, fat and vitamins of the B complex. Neurectomy of the tibial and superficial peroneal nerves was tried in one case, with relief, the nerves being found at operation to be very swollen. Working next at the 75 km mark on the Siam-Burma railway, the author found some 300 men sick with amoebic dysentery, relapsing malaria (some cerebral), tropical ulcers, suspected cholera, corneal ulcers and

the small hut was for infectious cases, was known as the "dead house", and contained 100 dysenteric patients. Post mortem examination of 12 cases of amoebic dysentery showed sloughing of the lower part of the colon, ulceration and sometimes gangrene up to but never beyond the ileo-caecal valve, occa-

insisted that the term amoebic dysentery be deleted from some 30 death certificates and replaced by the term *hili diarrhoea*. Later a microscope and a bottle of extract of *ippecacuanha* were obtained. From the extract a Dutch medical orderly prepared 150 doses, each of 1 grain of emetine which used in courses of 5 injections produced a dramatic arrest of haemorrhage and tenesmus.

As 1943 wore on, pellagra became apparent, and was characterized by a sore fissured tongue, angular stomatitis, anorexia, dysphagia, persistent watery

hydrocephalus, such patients having mental symptoms before death. Nicotinic acid had it been available would not have been effective as the changes were irreversible. Fat and protein were the real deficiencies, and many patients were saved by meat clandestinely obtained from the local villages at night. Nutritional oedema was often associated with pellagra. It was first thought to be beriberi, but attempts to relieve it by vitamins failed while there was a remarkable response to meat plus deprivation of fluid. The term beriberi was however, often used in death certificates, as it was one of the few terms the Japanese could appreciate.

form dressings and rest produced suppuration and healing. In patients forced to work, suffering from frequent malaria, malnutrition and exhaustion, the ulcers spread, penetrating and blood vessels there pus formation, and gangrene about 60 patients, and widespread removal of tissue including the *Tendo*

When meat was given, even large ulcers began to suppurate, quietly formed sequestra, and when the sequestrum was removed finally healed. The Dutch did not suffer as much from ulcers as did the British and Australian troops. Remarkable bamboo pylons and crutches were improvised for the limbless patients.

In January and February 1944, a new camp, the Nakompaton Sanatorium, was constructed 35 miles from Bangkok, for 10,000 chronically sick and disabled European prisoners from the Burma-Siam railway. The equipment was minimal, and the medical staff allotted by the Japanese numbered only three medical officers and 13 medical orderlies per 1,000 patients. Food was issued on the following basis: vegetables variable; inside worker 100 gm.; patients, rice 400 gm., the sick should receive little or no food. Red Cross supplies of drugs arrived in the middle of the year and were invaluable, providing enough emetine for a half course of treatment for 250 of the 1,346 patients suffering from amoebic dysentery. A demonstration that scrotal dermatitis was heralding an outbreak of pellagra induced the Japanese to issue rice polishings, 25 gm. per man per day, while clandestine trading, raising of ducks and pigs also helped. Many cases labelled beriberi were shown to be examples of effort syndrome. Blood transfusions, with defibrinated blood which gave surprisingly few reactions, was found a most useful contribution to the healing of all sorts of conditions. Amazing improvisations were devised in the pathology department. Sexual perversions were rare, and no murders and only two suicides were recorded in 18 months, while the number of mental patients under restraint never numbered more than 30. Aseptic surgery was not possible, but 896 major operations were satisfactorily performed. Naked hands were scrubbed in several changes of water and then immersed in alcohol made in the camp, gowns were sterilized in a home-made autoclave, instruments were boiled and the skin was cleansed with alcohol. Interrupted cotton sutures without tension and as few catgut ligatures as were compatible with haemostasis were employed. Spinal anaesthesia was used for all operations below the nipple and usually local anaesthesia elsewhere, as there was no ether and very little chloroform. Naked hand technique was found unsuitable for exploring the abdomen, adhesions resulting from infection from the sweating hand. Renal calculi were particularly common, there being some 65 cases at the time of release. Physiotherapy proved invaluable, and the department with its attached workshops provided artificial limbs ingeniously made from odds and ends for 170 men. Morale was maintained at a high level, and in May 1945 the underground news service, operated at great risk and with great courage, made the camp aware that release was imminent. The overall mortality figure of 3 per cent. for the camp is a tribute to the medical staff and their splendid work.

ii. An allied general hospital, captured in Java in March 1942, was brutally dissolved and its medical stores ruthlessly confiscated. Despite protests, the patients were marched to an overcrowded gaol where medical arrangements were negligible, rations deplorable and no recognition was given to medical personnel. Within a few months deficiency diseases appeared, the early symptoms being angular stomatitis, glossitis, pigmentary changes and a dry scaly skin, followed later by scrotal dermatitis; there was later opportunity to prove that 6 to 8 mgm. riboflavin daily rapidly brought about improvement of the condition. Painful feet became troublesome; there was usually marked sweating with a clammy feeling, the deep muscle reflexes were hyperactive, with sometimes clonus and rarely spastic diplegia. At this time dimness of vision was also noticed, especially affecting the centre of the visual field.

diagnosis of suspected chronic amoebic infections and for test of cure, he thinks sigmoidoscopy important, with microscopic examination of scrapings from all doubtful ulcers

iv The rapidity of the fall of Singapore resulted in the captured force having a large number of skilled medical persons, and large quantities of drugs instruments and equipment the position would therefore not have been so sombre had it not been for the ever present deficiency of food

The outstanding problem at first was the dysentery epidemic, but owing to the complete co-operation of all units in camp hygiene it did not assume the proportions originally feared In treatment, sulphapyridine was found extremely valuable when supplies of sulphaguanidine were not available

Deficiency diseases eclipsed all other medical problems Beriberi appeared within six to eight weeks but in order to induce the captors to increase the diet it was deliberately overdiagnosed all cases of oedema of the feet or of sudden death being so classified Other deficiency diseases followed and

estimated riboflavin content of about 5 mgm of diphtheria with remarkable skin manifestations The value of X ray examination of the chest appeared demonstrated since the Australian troops who had been so examined on recruitment developed no tuberculosis until a year after captivity whereas the British had 30 cases within the first six months

In May 1944 the hospital was moved to Kranji 25 miles across the Island and near the Johore Causeway Here 1 200 patients were accommodated in palm leaf huts but owing to the large population at Changi and the breakdown of transport more sick were finally dealt with at Changi than at the new

and many
ed Cross
amounts w

features and a theatre were unprovoked lectures were organized and ward rounds and medical society meetings were held all these welfare activities contributed greatly to maintenance of morale as did the provision of a daily

were ubiquitous beating of the sick was common and the Germans made a definite attempt to exterminate the Russians The first task, therefore, was to the hospital
best and most alert prisoners were
Patients were segregated into wards

according to diseases. Red Cross parcels, provided for the British but not for the Russians, were shared out and saved innumerable lives. A garden was started and subscriptions from the British prisoners were used to purchase drugs, food, instruments and comforts. A sports field was constructed as well as work rooms, laundry and facilities for welfare activities.

The medical work was performed by a team of six medical officers, of mixed nationality; on the surgical side during 15 months, 375 major operations were carried out, including 83 appendicectomies, 41 herniotomies, 2 gastrectomies, 7 craniotomies, in addition to numerous other procedures, without a death among the British patients.

vi. After many hours in oil-covered water, over 300 men were crowded into one hold of a Japanese prison ship and were taken to Java. Dressings, medicines and food were all scarce, and, three to four months after capture, the prisoners began to show evidence of deficiency diseases. Some developed oedema and some pellagra, the latter being accompanied by an intolerable itchy weeping eczema of the scrotum. Later the prisoners were transferred to Japan, where conditions were equally deplorable. Of one ship-load of 1,000 prisoners from Singapore, 80 died from starvation and dysentery before reaching Japan, 200 died soon after arrival, and 40 per cent. were dead within 3 months of arrival. In a camp on the north coast of Honshiu Island, diarrhoea soon became almost universal. suffering from nerve

Bradycardia was the
se in rate was of bad
prognostic significance, although sometimes death occurred with persistent bradycardia. Pulse pressures were always low. Treatment of infections with sulphonamide drugs often precipitated the onset of beriberi, usually after a latent period of about a week, probably because of destruction of intestinal bacteria and consequent inhibition of vitamin synthesis. Thiamin in large doses had only slight effect on the oedema, and the most successful method of treatment was rest. pellagra
were glazed tongue
scrotum, defective
mental deterioration. In their efforts to obtain relief from painful feet by cooling, many men contracted frozen and gangrenous feet, analogous to trench feet.

vii. Facilities for dealing with surgical casualties in Singapore during the first few months after its capture were reasonably good as there was a considerable amount of equipment, and the main difficulties arose from malnutrition and infection. Later, in Siam, these difficulties became even more the prominent problem. Rations were worse, especially as regards fat, protein and vitamin content, the region was highly malarious and the indigenous population nearly all carried amoebic infection. An epidemic of cholera killed 25 per cent. of the camp strength in 6 weeks, and acute phagedaenic ulcers appeared three weeks after arrival in Siam. The ulcers developed sometimes spontaneously as a small vesicle on an indurated inflamed base, or they followed some minor scratch or cut. In the severer cases, progressive and extensive destruction of the tissues occurred, with intense pain and toxæmia. The best treatment appeared to be early excision of the necrotic tissue, but once the deep fascial barrier was penetrated secondary operations such as excision of necrotic tendons and sequestrectomy were often necessary, while in the advanced stages amputation was the only treatment even though its mortality was high. Experience demonstrated that necessary surgery can be performed in any circumstances provided fuel

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and water are available and there is an adequately trained staff accustomed to improvisation. The Steinmann pin was found of great value in the treatment of fractures of the lower limb under primitive conditions. Its simplicity and portability make it invaluable where no plaster strapping or bandages are available. The author also found chloroform a safe and economical anaesthetic under the conditions of tenuous supply lines.

F Murgatroyd

MARRIOTT H L HILL I G W HAWKLEY J C BOMFORD R R
 Medical Experiences of the War in the South-East Asia Command I IV
 Trans Roy Soc Trop Med & Hyg 1946, June 39 No 6 461-79
 1 chart Discussion 479-84 (HOOD A BENNET J BENNET E A
 MANSON BARR P MACGREGOR R B MURGATROYD F BIGGAM
 A G NAPIER L E MARRIOTT H L (in reply))

Dr H L MARRIOTT said that the primary lesson was that in warfare in tropical regions medical considerations are of pre-eminent importance. In 1942 and 1943 units of the Eastern Army sometimes had sickness rates so high that practically every man had gone down with sickness and been admitted to hospital inside 2 months. Even in 1944 the admission rate was 1 000 per 1 000 per annum and the ratio of casualties from sickness to casualties from wounds despite much heavy fighting was 19:1 while in 1943 the ratio had been 121:1.

Malaria was the greatest problem and caused about half of all sickness. Suppression of mepacrine 0.1 gm daily caused a remarkable drop in the incidence of malaria and the value of DDT was becoming demonstrated in the closing stages of the Burma campaign. Avoidance of native areas at night and personal protection by nets, clothing and repellents were also important. Diarrhoea and dysentery causing a hospital admission rate of about 100 per 1 000 per annum were the second greatest trouble. The proportion of cases showing *E. histolytica* was about 20 per cent. It seemed that water might be the chief mode of spread.

both bacillary and amoebic dysentery, it is essential that some method of water purification shall be found which will kill amoebic cysts. The most prompt use of sulphaguanidine and mass treatment with sulphonamide drugs was also the answer to high incidence of dysentery. Anaemia was common in Indian troops and the primary cause apparently being blood destruction from chronic malaria. A contributor to them since Indian scruples of religion or custom require unacceptable to them the low meat-content of their diet as tinned beef was goats or sheep killed according to Hindu or Muslim rites. Plans were begun during the war for the large scale manufacture for the Indian Army of canned meat certified by religious leaders as having come from animals killed in a proper manner. Such plans should now be developed. Scrub typhus is a worry from the autumn of 1943 onwards about 1 man in 100 contracting the disease. Skin diseases and impetigo caused a hospital admission rate per annum of 1 man in 20. The admission rate for venereal disease prevention was much too low and that it was absurd that less than 5 per cent of the medical personnel were engaged in purely preventive work while most of the rest were engaged in treating diseases which in many instances need not have occurred if known knowledge had only been applied. He suggested that an allocation of 30 per cent of the personnel to prevention should be a part of the whole Army's more education and one of the most important sections of a medical directorate should be a section for expert propaganda of hygiene.

Early and adequate treatment of disease is of the greatest importance. Malaria can be controlled in 2 to 3 days, bacillary dysentery in a few days, skin diseases can be cured quickly if tackled early, gonorrhoea can be cured with penicillin in 24 hours and syphilis in a week; these conditions accounted for three-quarters of the total hospital cases. Therefore, that for future wars in the tropics the medical services should be able to treat 75 per cent. of medical casualties in light hospitals or units attached to corps or divisions, while provision of base hospital beds, outside operational areas, should not be for more than 25 per cent. of the expected cases of sickness. Bearing on this a tradition should be created that fosters the importance of the R.M.O., and a reform, basic to such a tradition, is that at least half of all R.M.O.s should be majors.

The trend of sickness rates during the war was that the lessened incidence of sickness was linked with the use of sulphaguanidine, while every effort was made to treat cases as far forward as possible. The abrupt fall in the incidence of malaria between October and November, 1944, coincided with the enforcement through staff channels of mepacrine suppression; as a corollary there was a marked drop in the incidence of cerebral malaria and blackwater fever. The low incidence of smallpox among large bodies of men exposed to high risk of infection from Burmese villagers and

was probably seasonal, although by that time measures of personal protection by dibutylphthalate were in use.

Dr. J. C. HAWKSLEY said that the state of the Japanese prisoners taken in July and August 1945 showed how completely their medical services had broken down; over 80 per cent. had malarial parasitaemia, and diarrhoea was rife. The principal problems among the prisoners of war and civilian internees in the Japanese hands were chronic diarrhoea, malaria, beriberi and straightforward starvation; medical officers sent forward for the relief of prisoners of war in circumstances where conditions are unknown should contain a proportion

more up-to-date knowledge than can be expected from either a consulting physician or an ADMS in charge of medical stores.

Dr. R. R. BOMFORD stated that the low sickness rates, together with efficient air evacuation, enabled the medical services to meet the commitments of the last month or two of the 14th Army's campaign with an actual forward bed cover of 2.7 per cent. for British troops and 1.7 per cent. for Indian troops, instead of the 7 per cent., or more, generally considered necessary in tropical

plasma-protein oedema, malnutrition diarrhoea, and anaemia. He thought the association of retrobulbar neuritis, 8th nerve deafness and spastic paraplegia, recently regarded as a syndrome, was probably only a coincidence. Malaria was not as serious a problem in Singapore as in Siam; dysentery, especially amoebic on account of the scarcity of emetine, caused much illness, and

diphtheria more than half of which were cutaneous cases in some outbreaks was a serious problem

In the subsequent discussion Lieut General Sir Alexander HOOD referring to the difficulties encountered said that we were not equipped nor prepared either with men or with materials to fight more than one war at a time priority had first to be given to the Middle East then to North Africa and Italy later to North West Europe and finally to the 14th Army He agreed on the importance of hygiene officers but pointed out that what is required is to inculcate into the Commanders in the field the necessity of hygiene measures before they can be carried out and that this was one of the great achievements of Brigadier Hamilton Fairley's work in Australia

Dr E. A. BENNET said that many patients apparently suffering from psychiatric illness were found to have some physical disease particularly malaria and he emphasized the need for the complete physical examination of patients with psychiatric symptoms The campaign in Burma was conducted in difficult country necessitating a special psychiatric organization each division was provided with a small psychiatric unit and this worked so well in practice that it is worthy of close consideration in the medical planning of a campaign especially in tropical countries

Sir Philip MANSON BAHR said that the majority of the ex internees from

Dr R. B. MACGREGOR thought that both beriberi and hunger oedema occurred sometimes at the same time sometimes separately sometimes in different individuals or in the same individuals at different times In fact the most striking feature was the different reactions of individuals exposed to precisely the same conditions of privation and hardship He also drew attention to the oedema of plenty which so frequently supervened when the prisoners were released and were given plentiful food again

Dr F. MURGATROYD also remarked on this latter form of oedema which he

General A. G. BIGGAM emphasized the importance of preventive medicine in tropical combat areas Referring to the high incidence of amoebic dysentery he said that although the treatment of amoebic dysentery was not entirely satisfactory yet treatment with penicillin and sulphonamide prior to specific anti amoebic drugs had entirely changed the outlook in chronic infections and that it was seldom that cure was not now effected

Dr L. E. NAPIER was horrified to hear that it was the end of 1944 and the beginning of 1945 before principles of malaria prevention that had been laid down 10 years before were applied effectively Admittedly the suppressive dose of mepacrine used pre-war was too small but it should not have taken very long of 1944 although was still a very high pping senior medical ng officers should be taught a little more tropical medicine

F Murgatroyd

EARLE K. V. Penicillin in the Treatment of Tropical Pyomyositis *J Trop Med & Hyg* 1946 Dec v 49 No 6 111-12

(1) The successful treatment by penicillin in two cases of tropical pyomyositis is described.

"(2) The superiority of penicillin over sulpha drugs in the treatment of this disease is tentatively indicated."

RADOVICI, A. Sur une épidémie de lathyrisme. [An Outbreak of Lathyrism.] *Bull. Acad. Méd. Roumanie.* 1945, v. 17, Nos. 1/3, 77-86.

In the winter of 1942-43 rumours began to spread of an "epidemic of paralysis" among the inmates of a concentration camp at Vapniarka. Communication from outside, either personally or by writing, was prohibited and it was surmised that the disease was heriberi. Soon after, however, a lady doctor was among those sent to the camp and she observed that the paralysis was of a spastic type. Further investigation revealed that the diet consisted of dried peas of poor quality, boiled in water and a slice (100-200 gm.) of bread made with oat-flour, potatoes and straw. The "Vapniarka peas" proved to be *Lathyrus sativus*. An interview was obtained with the Minister of Public

time previously been compelled to work hard, on an inadequate diet, and several showed signs of pulmonary tuberculosis. The diet prior to their removal had consisted of 200 gm. of *Lathyrus* and a thin slice (80 gm.) of bread, and on arrival they were suffering from hunger oedema and some died before the signs of lathyrism appeared. Such symptoms began to manifest themselves in October-November 1942—muscular cramps and frequent micturition—and the first case of spastic paraplegia was observed on December 27th. By January, cases numbered 600 and 35 per cent. had spastic paraplegia. Those who escaped were such as were able to buy other food or those receiving parcels of food from relatives outside. Towards the end of January 1943, other food was substituted for the *Lathyrus*; no new cases occurred and those afflicted began to improve; of the 650 sick in December only 65 presented symptoms in the following February, and only 51 suffered from paraplegia or paraparesis. Later a few of them relapsed; the cause of this could not be ascertained and the only surmise was that the work was too heavy, the food inadequate and the weather humid. In practically all, cramp, especially of the leg muscles, and frequent micturition preceded the paraplegic or paretic symptoms; hemeralopia was another symptom "common to all".

Treatment comprised administration of brewers' yeast, vitamin B, hyposulphite and nitrite of sodium, calcium, acetyl-choline, antispasmodics such as luminal and papaverine, and liver extract. Physiotherapy and ionization gave poor results, but some amelioration seemed to follow injection of Pelacotine [this is not defined, nor is the dose stated], vitamin B₁ and liver extract.

H. Harold Scott.

GENERAL PROTOZOOLOGY.

PRATT-THOMAS, H. R. & CANNON, W. M. Systemic Infantile Toxoplasmosis. *Amer. J. Path.* 1946, July, v. 22, No. 4, 779-95, 6 figs. on 3 pls. [23 refs.]

The case described is that of toxoplasmosis in a new-born infant, which proved fatal on the fifth day of life. It is the first case to be recorded from S. Carolina and probably the first from the south-eastern States. The child was the first of the parents, who are both in good health. The infection appears to have commenced just before or just after birth. Toxoplasmata and accompanying lesions were found in the brain, spinal cord, heart, lungs, adrenals,

stomach pancreas and diaphragm. The infection was evidently of short duration and was in its invasive stage. There was complete absence of the calcification which is characteristic of those of longer standing. This is the 21st case of toxoplasmosis proved by necropsy. Fifteen of these were in infants, 2 in children and 4 in adults. In a very useful table details of the 21 cases are set out in a comparative manner. *C M Hemon*

GENERAL ENTOMOLOGY

MUESEBECK C F W Common Names of Insects approved by the American Association of Economic Entomologists *J Econom Entom* 1946 Aug v 39 No 4 427-48

BRISTOWE W S MELLANBY K Man's Reaction to Mosquito Bites [Correspondence] *Nature* 1946 Nov 23 750-51

i. The writer refers to Dr Mellanby's previous note [*this Bulletin* 1947 v 44 240] and points out that since biting insects have a preference for different hosts it would be important to discover whether those who claim that they have never been bitten by any insect are giving accurate evidence or whether they have reached Stage IV described by Dr Mellanby and do not suffer from any bites which they may have received. The writer further suggests that if the results of tests indicated such a course it might be possible to develop some method of inoculation which would make man unattractive to biting insects.

The writer makes the startling statement that in the world as a whole more premature deaths are probably brought about annually by the direct and indirect results of insect bites than from any other cause and goes on to point out the discomfort apart from the danger of many insect bites and the vast sums expended in the destruction of biting insects and in the control of diseases caused by them.

ii. Dr Mellanby in reply quotes experiments in which *Aedes aegypti* and *Anopheles maculipennis atroparvus* when they were hungry and had no alternative source of food appeared to feed equally on every person whom opportunity presented. In the more difficult experiment of giving mosquitoes a choice of individual on which to feed no consistent preference or avoidance of any particular persons were noted.

He considers that the explanation of different individual attraction is to be found in differing reactions to the bites for example the delayed reaction in a person experiencing it may suggest to him that every bite which is itching on a particular occasion has been recently inflicted though such results have in fact followed attacks on the preceding 3 or 4 days. The delayed reaction to bites is much more troublesome than the immediate and persons in Stages I and II are more conscious of a mosquito nuisance than those in the late stages.

Experimental evidence tends to minimize the importance of individual attractiveness and although Dr Mellanby believes that this factor may be found to exist he does not consider that it is likely to be an absolute one or important enough to indicate a method of control.

H J O D Burke Gaffney

RIBBANDS C R Man's Reaction to Mosquito Bites [Correspondence] *Nature* 1946 Dec 21 912-13

This letter refers to BRISTOWE's query see above regarding individual attractiveness to mosquitoes.

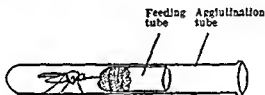
The author was able to show experimentally by deterring mosquitoes from huts by means of minute quantities of pyrethrum, that about 250 per cent. more females of *A. funestus*, *A. gambiae* and *A. melas* were attracted to three particular men than to a fourth; and the reverse observation was noted over a period of three months in which sleeping duties were in rotation. He was also able to prove variation in attractiveness of the same person at different times. For example, the least attractive of three men suddenly became more attractive for 8 out of 9 days, and in this period attracted 186 *A. melas*, as compared with 77 for his nearest rival. The author quotes DE MEILLON [this *Bulletin*, 1936, v. 33, 245] who showed that thorough deodorization with soap and water considerably diminished attractiveness to *A. funestus*: but he does not consider that this sufficiently explains present results which he believes to be due to personal physiological variations.

Whilst there are probably wide differences between relative attractiveness of persons of different habits, the author, who knows of no proved case of immunity, considers that claims of it sometimes made are erroneous.

H. J. O'D. Burke-Gaffney.

MATTINGLY, P. F. A Technique for feeding Adult Mosquitoes. [Correspondence.] *Nature*, 1946, Nov. 23, 751, 1 fig.

The author starts with a single mosquito in an agglutination tube, which is kept horizontal. Into it he slides a short length of glass tubing, the "feeding tube", of such diameter as to make an easy fit. The inner end of the feeding tube, next the mosquito is plugged with gauze, on which defibrinated blood or some such food is placed with a pipette.



Illustrating technique for feeding single adult mosquitoes
[Reproduced from *Nature*.]

It is found that the age of the mosquito has an important influence on its feeding; for instance, under West African coast conditions *Culex fatigans* feeds most readily when 72 hours old, and *Anopheles* at 60 hours.

For
able to feeding in a cage from an open surface of gauze or through a membrane.

With this method, the author can infect single insects with blood containing virus;
and rec
logical
of sugar and so forth.

P. A. Buxton.

WOODHILL, A. R. & PASFIELD, G. An Illustrated Key to some Common Australian Culicine Mosquito Larvae, with Notes on the Morphology and Breeding Places. Reprinted from *Proc. Linnæan Soc. New South Wales*, 1941, v. 66, Pts. 3-4, 201-14, 11 figs. [14 refs.]

The terminal segments of the fourth stage larvae of nine common Australian culicines are figured and described and a key is given for their identification.

Other eggs were exposed to outdoor temperatures ; some were immersed and some were kept dry throughout the winter, and others were alternately wetted and dried. On 3rd March all eggs were immersed and observed until 3rd April.

situations.

hatched ;

28.4 per cent. of those that were intermittently wetted. In general, those which were partially protected produced more larvae than those which were exposed.

The mean period of immersion before hatching was 32 days, but there was delayed hatching among eggs which had been immersed since early winter, whereas eggs which were immersed in February hatched more quickly. Among larvae which hatched out before 15th February, only 17 per cent. became adults but of 1,883 larvae closely observed throughout the winter 985 (52 per cent.) produced adults. Most of them took 2-3 weeks from the time of hatching to complete development and to emerge as adults but many died within 2 or 3 days. Most females which emerged after the middle of February lived long enough to mate, feed, and lay eggs.

Two susceptible stages were noticed ; newly-hatched larvae and larvae about to pupate were more easily chilled than others. Another observation was that no individual lived that remained as a pupa for more than ten days.

From the point of view of control, the author points out that during mild winters special attention should be paid to the elimination of all small water receptacles as they may contain eggs of *Aedes aegypti* which later may hatch out and produce adults.

H. S. Leeson.

AGRICULTURAL RESEARCH COUNCIL. Colonial Insecticide Research, Entebbe. Progress Report No. 1 [SYMES, C. B., Entomologist-in-Charge]. 42 mimeographed pp., 2 maps (1 folding) & 3 plans. 1946. London : Inter-Departmental Insecticide Committees, Agricultural Research Council, 6A Dean's Yard.

Field and laboratory experiments have been commenced in Kenya, Uganda and on certain islands in Lake Victoria to determine the value of the insecticides DDT and gammexane for the control of the tsetse fly *Glossina palpalis*. This is a full report of work so far accomplished during 1945-46 ; as a result, several matters of practical importance are shown to need further elucidation. One of the chief problems is the loss of insecticide through absorption into the leaves of plants.

On one of the islands, a 5 per cent. solution of gammexane in equal parts of kerosene and cotton seed oil sprayed on vegetation at the rate of approximately 2.2 quarts per 1,000 square feet produced a reduction in the tsetse population of about 50 per cent. over some ten days ; numbers then began to recover and about four weeks later had reached the pre-treatment figure.

A second spraying resulted in a reduction of the tsetse numbers by 80 per cent. for a week, but seven weeks later they were back again to 80 per cent. of the original figure.

On another island a trial was made with 5 per cent. DDT in equal parts of kerosene and cotton seed oil at the rate of 2 quarts per 1,000 square feet. An immediate reduction in the tsetse population of about 80 per cent. seemed apparent. This lasted for a week after when the numbers continued to increase, until by the sixth week they were back to the original figure.

On plants the leaves were still tacky after three weeks, non-hairy leaves showed little signs of burning, but the soft hairy-leaved plants had turned brown and died. Chemical determinations of deposits on these leaves indicated that there was appreciable loss of insecticides through absorption.

North latitude but owing to the mountains in its centre the varieties of climate are great

There is one Institute of Tropical Medicine with 12 laboratories for research and a research hospital of 36 beds. It publishes its own review of work carried out there the *Revista del Instituto de Salubridad y Enfermedades Tropicales*. Many of the researches being prosecuted are listed including onchocerciasis, pinta, mycotic infections, typhus and infant diarrhoeas.

In 1942 a special hospital of 50 beds for the reception and study of onchocerciasis patients was opened at Huixtla, Chiapas, on the railway, 48 kilometres from Tapachula. Since 1943 the Pan American Sanitary Bureau has been cooperating in the onchocerca research. Opportunities for the study of pinta

a Field Training Station for those intending to engage in Tropical Medicine which takes doctors and those who have some knowledge of clinical tropical conditions and of laboratory work from Mexico, the United States and Latin America.

The Board of Health and Assistance also regulates study in nutrition with a hospital of approximately 100 beds, apparently well equipped and with laboratory facilities.

For more general health work there is a School of Hygiene (Escuela de Salubridad e Higiene) in Mexico City, this has been established since 1924 for the training of Medical Officers of Health, Nurses and Sanitary Inspectors. A new building was erected in 1939 with a large auditorium, three lecture rooms, five laboratories, a library, etc. The course for Public Health Officers extends over 40 weeks in four equal periods, the last of which is devoted to field training and special emphasis is placed on laboratory training in bacteriology, biochemistry and parasitology.

Mexico offers these facilities to students and research workers of countries other than her own.

H. Harold Scott

BOOK REVIEWS

REES, Paul F. M.D. M.P.H. etc. WEST, L. S. (Ph.D. etc.) & MAXWELL, Reginald D. (Sc.D. etc.) *Practical Malariology*. Prepared under the Auspices of the Division of Medical Sciences of the National Research Council. Foreword by Raymond B. Fosdick. pp. vii + 684. 238 illustrations (8 in colour). 1946. Philadelphia & London: W. B. Saunders Company. [40s.]

This book opens with a foreword by Mr. Fosdick, the President of the Rockefeller Foundation, in which he writes: "We are living in the 20th Century and

we cannot retrace our steps back into the 19th. For better or for worse we find ourselves in an era in which our only hope of survival lies in collaboration across boundary lines." This need for collaboration, although it is not so stated, applies not only to nations but also to scientists, for malaria today has become a subject for intensive study by biologists as well as by doctors, nor can the work of chemists, physicists and engineers be neglected. It is appropriate therefore that this, the latest, and in the reviewer's opinion the best, book written on malaria should be the joint work of a doctor of medicine, a protozoologist and an entomologist. The aim of this trio is expressed in their preface in the following words, "The literature of malaria is vast and scattered. For some time there has been needed a book which would gather up the important features of malariology, integrating new developments with the old, and presenting a well-balanced account of this disease which, from the standpoint of prevalence, some authorities have called the most important in the world today."

That there is a real need for such a work can be proved by anyone who troubles to consult those books on malaria which have been published during the past 25 years. During this not inconsiderable, and certainly most productive, period of malaria history, a large number of books in many languages have been published on a variety of aspects of the disease, while several standard works on tropical medicine have appeared, and have contained good, but relatively incomplete, accounts of the malady and its vector. The only outstanding works, however, which have appeared during this period, which have concerned themselves solely with this subject, and which have considered it in all its important aspects, are limited in number, perhaps not more than half a dozen in all. The fact that these earlier volumes no longer fulfil their function, so that the modern worker contained in periodicals, is rather a reflection on the ability of the autho

attend the volume at present being considered, but the reviewer predicts that it will reappear in more than one revised edition before it can no longer be re-patched and must become replaced by the work of a new generation. That what they have written is not to be considered as "the last word" is, of course,

space the authors have compressed their account of malaria, which deals with every aspect of the disease and the parasite, its vectors and its control. To fit so much information into so small a space will at once suggest over-crowding, over simplification, or else the omission of material vital to a proper understanding of the subject. To avoid these pitfalls must have proved a difficult task, which can only have been achieved by experienced workers determined to shift the scientific grain from the conjectural chaff. Truly, there are but few wasted words in this trenchant account, and it is possibly the authors' striving for verbal economy which has led them to omit a generally accepted "the" from many of their sentences; thus on page 234 we read, "the tip of the point is bent downward slightly, usually by means of thumb-nail and the right side of thorax glued to the slanting surface" Such omissions are irritating to the average reader, particularly since the small space thus saved might have been less crudely gained by the avoidance of certain, admittedly rare, repetitions, such as the twice made explanation, in almost identical words, of "blue cloud" on page 44. But these trivial curtailments do little to mar a style that is always vigorous, clear cut and often vividly descriptive, as when the authors are writing of mosquito pupae, "A sudden shadow may send them tumbling to

adorning shelves as lying on the work benches of all those who are interested in the study of malaria

R. M. Gordon

PAVLOVSKY, E. N. Member of the Academy of Sciences and of the Academy of Medicine of U.S.S.R. Lieutenant General of the Soviet Army Medical Service. Professor of General Biology and Parasitology in the Military Medical Academy. Laureate of Stalin's Premium etc. *Manual of Human Parasitology*. Vol. 1. 521 pp. 10 pls. & 375 text figs. 5th Edition. 1946. Moscow-Leningrad. Published by the Academy of Sciences of U.S.S.R. [In Russian. 44 Roubles.]

In 1924 the author published a short *Handbook of Human Parasitology*, which in its second edition (1934) appeared as a completely revised and amplified *Textbook of Human Parasitology* (this Bulletin 1936 Vol. 33:330). According to the preface the present edition though ready for publication in 1940 was

remained unchanged.

The present edition of Pavlovsky's *Manual of Human Parasitology*, while covering the same ground as the second edition has expanded considerably and is now brought out in two volumes of which this is the first one.

This volume is devoted to the protozoa and helminths. In the introductory

description is given of their morphology, life-history and effect upon the host. In the case of malaria parasites and helminths standardized methods of prophylactic and therapeutic treatment are also adduced. This text book is primarily adapted to the needs of Soviet Public Health and of the Red Army. As the only comprehensive treatise on medical parasitology in the Russian language, written by its foremost exponent in U.S.S.R. it will doubtless enjoy the same

exclusivity. The alphabetical indices are on a lavish scale comprising Russian and Latin names of animals, authors' names, subject index, geographical and ethno-geographical index and an index of Latin terms. C. I. Hoare

WAR OFFICE. Manual of Chemistry for Dispensers. W.O. Code No. 1612. 206 pp. numerous figs. 1931 (Reprinted 1946). London: H.M. Stationery Office. 3s. 6d.

This manual should prove of value to those charged with giving instruction in elementary chemistry and physics to medical and other students in the training schools of tropical dependencies.

and physics as will enable a student on paper to understand the main principles of pharmacy and of the first aid treatment of poisons.

H. J. O. D. Burke-Gaffney

TROPICAL DISEASES BULLETIN.

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[No. 4.]

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

(Continued from p. 274).

Treatment.

General.—NAPIER (p. 10) contributed to the *New England Journal of Medicine* a paper discussing the value of some old and some more recent antimalaria drugs. Though it is a short paper, the summary is interesting and informative. CHOPRA, R. N. and CHOPRA, I. C. (p. 304) show how failure of response to oral administration of antimalaria drugs may be due to delayed absorption resulting from inflammatory conditions of the intestinal mucosa

mepacrine hydrochloride was four times as toxic, and pamaquin hydriodide fourteen times as toxic, as quinine hydrochloride.

According to STEVENSON (p. 407) the distressing chill preceding the fever of the malaria attack can be relieved promptly, if calcium gluconate, 10 cc. of a 10 per cent. solution, is slowly injected intravenously, as soon as possible after the onset of the chill. In some cases the relief, says Stevenson, is almost instantaneous. The results were equally good in *P. vivax*, *P. falciparum* and mixed infections. Certain precautions are recommended. Care to see that the injection is intravenous; if the subcutaneous tissue is involved, necrosis may ensue. The procedure is contraindicated in cases of arrhythmia and bradycardia and in those receiving digitalis therapy.

Claims for reduction of an enlarged spleen and for amelioration of the associated symptoms have been advanced by PODLESKEE (p. 13). He injected slowly, intravenously, 10 cc. of a 10 per cent. calcium chloride solution on each of five successive days. Contraction of the spleen throws the malaria parasites into the blood-stream where they are attacked by antimalaria drugs.

PLOTNER (p. 393) finds that artificial fever may cause disappearance of malaria parasites [on the other hand, it may have no such effect] and is, therefore, worth trial in relapsing cases, in conjunction with chemotherapy. ZELIGS (p. 202) speaks of post-malaria headache which is quite refractory to

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

the usual headache remedies. It is in most cases frontal and is present in the early morning improving as the day advances. Some patients find benefit from the oral administration of 100 mgm of metotinic acid.

Quinine—MARSHALL and ROGERS (p 98) have devised a colorimetric method for determining and estimating cinchona alkaloids based on the formation of a coloured compound with bromothymol blue.

HALAWANI and NOR EL DIN (p 1109) report a case of Raynaud's syndrome, adding to gangrene and loss of the toes of one foot after intragluteal injection of quinine. The patient suffered from syphilis as well as from chronic malaria. JALUSHAINA (p 300) made trial of irradiated quinine in the treatment of malaria. The febrile attacks were observed to cease rapidly and no relapses were seen in patients kept under observation for 18 months.

HANZLIK and CUTTING (p 820) conclude that a combination of quinine and epinephrine intravenously is a safe initial treatment in cases of cerebral malaria. They recommend 0.5 gm quinine hydrochloride (or dihydrochloride) and 1 mgm epinephrine in 250 cc of isotonic NaCl solution injected over a period of not less than 30 minutes. Two even three such injections may be given in 24 hours.

When stocks of quinine were low in the war FLOCH (p 820) found that the use of adjuvants (resorcin and methylene blue) in a mixture with quinine for intramuscular injection effected great saving in quinine.

Mepacrine (atebrin)—LANGE and MATZNER (p 1109) describe methods based on measurements of fluorescence for detecting the distribution of mepacrine in the blood, skin and cutaneous appendages (the nails). The last was a good and ready indication whether the drug was being taken regularly. GINSBERG and SHALLENBERGER (p 1007) noted that for 3-6 months after cessation of treatment with mepacrine the Wood light reveals a fluorescence in the finger nails. Exercise is therefore delayed longer than was generally thought. KIERLAND and his co-workers (p 1008) noted the same thing in persons who had been taking mepacrine for 5 to 21 months. The fluorescence began to fade three months after the drug was stopped and disappeared in 6-7 months. LIPPARD and KAUFER (p 526) observed in men who had been taking mepacrine for 7-29 months a slate grey pigmentation of the hard palate starting near the midline and extending to the alveolar margin and under the nails spreading from the centre of the nail body and of the skin adjacent to the nails of the toes. The pigment contains iron and may be haemosiderin.

MOST and HAYMAN (p 1005) compared the relative efficiency of mepacrine and quinine in the treatment of acute attacks of malarial fever. In each case treatment was started on the day after the onset of the attack. The mepacrine was given thus: 1 gm in three divided doses on the first day then 0.1 gm twice daily for six days a total of 2.8 gm. Those on quinine were given 1 gm on each of the next 13 days that is 29 gm in the 14 days. In 48 hours mepacrine had cleared the peripheral blood of parasites in 77 per cent but of those receiving quinine this result was observed in 44 per cent only. Moreover the former proved to be more prompt in the control of symptoms. Patients with eczematoid or exfoliative dermatitis should not be given mepacrine if they have had the drug before. LOONEY (p 1006) showed that mepacrine was better than quinine also in *falciparum* infections when tried on 883 European patients in Freetown, Sierra Leone.

ABBEY and LAWRENCE (p 627) have dispelled the idea that the continued use of atebrin in doses of one tablet (0.1 gm) daily affects the visual acuity of air pilots. MARGRAITH *et al* (p 99) gave mepacrine in doses of 0.4-0.7 gm weekly for several months to healthy young adults and found that such doses even continued for long periods had no harmful effects on the blood.

SMITH and STOECKLE (p. 1109), from experiments with isolated heart-lung preparations of dogs, stress the danger of intravenous injections of mepacrine if it is given rapidly.

THOMPSON (p. 98) trying varying dosage of mepacrine on American soldiers who, in England, relapsed with benign tertian malaria contracted in the Mediterranean, observed that relapses were fewer when large initial doses, 0.6 gm. were given. To a few as much as 1.0 gm. was given as an initial dose, but they showed toxic symptoms—nausea, vomiting and diarrhoea, and in one patient, mental symptoms. The effect on the parasites was noted; the plasmodial pigment was clumped in 45 minutes and disintegration was complete in about 6 hours.

Mode of administration seems to play a part; YUPKIN (p. 406) notes a case in which the drug failed when taken orally, but brought about rapid cure when injected intramuscularly.

Cerebral disturbances following the taking of mepacrine have been spoken of by several authors. SHIERS (p. 706) recorded a case of marked cerebral excitement after taking mepacrine, even in small doses. MERGENER (p. 405) reports psychosis after 2.8 gm. of mepacrine taken in 5 days. VOLLMER and LIEBIG (p. 201) state that, although rarely, atabrin may give rise to acute central nervous symptoms, and they mention illustrative cases, one in which a severe maniacal attack came on suddenly and lasted for nearly three weeks; another in which flaccid paraplegia developed; and a third patient who was violently delirious. All these followed on intramuscular injection of 0.3 gm., in two cases twice daily.

In contradistinction to these, mepacrine seems in other cases to have a low toxicity, as in one recorded by MARKSON and DAWSON (p. 12) where a man took successive doses for the preceding few minutes, with collapse, proved on his being given an intravenous injection of 15 minims of 1/1,000 adrenaline and 5 mgm. of riboflavin (as a possible antidote) and 2 pints of 30 per cent. glucose by intravenous drip. Recovery was complete in a few hours. BURNHAM (p. 525) mentions a recovery

for rats was enhanced when it was combined with a diet containing much calcium. Whether this is to be ascribed to increased absorption, decreased excretion, or to a specific effect of calcium on mepacrine metabolism, is uncertain. In this connexion the experimental work of FITZHUGH, NELSON and CALVERY (p. 525) with rats may be referred to. When the administration was kept up for long periods, the animals were found to be emaciated, and the heart and liver.

MAEGRAITH, FRANKLIN, *et al.* (p. 905) have carried out some interesting work on the effects of mepacrine on the alimentary canal of man, which go far to account for the untoward symptoms sometimes complained of after its administration. The dose of mepacrine was followed 1½ hours later by a barium meal, and observations were made radiologically. After a single dose of 0.6 gm. and upwards, there were complaints of headache, nausea and there might be repeated vomiting, colic and diarrhoea, and, in some cases, rise of temperature. The stools became watery, and there was a marked decrease in the secretion, and by atony of the bowels and there

was marked outpouring of secretory symptoms arose. During the week would complain of similar doses in the week. The authors conclude that when a dose of mepacrine is repeated at intervals greater than two days the tolerance for mepacrine in some of the subjects may be reduced by the time the third dose is given.

Some interesting accounts have been published on the use of mepacrine in combination with other drugs. For preventing relapses of benign tertian malaria FEDOROV (p. 12) has found the following satisfactory. A minimum of three courses each in a cycle of 3.5 and 3 days with ten day intervals between the cycles and a month between the courses. For the first course he gives 0.3 gm of mepacrine daily for the second and third courses 0.2 gm mepacrine together with 0.04 gm pamaquin. Of those who received all three courses only 3.5 per cent relapsed. 25 and 15.6 per cent of those who had had only one or two courses. Of untreated cases relapses occurred in 25.8 to 98.6 per cent.

reached in relation to *P. malar* infection namely that few if any were cured

after the suppressive atebrin had been stopped. Lastly there was a definite tendency to relapse in the fifth and sixth weeks after the first observed attack.

An interesting comparison was carried out by ROGAN and COOMBS (p. 524). They first investigated the efficacy of the standard Army treatment of troops in the field in Assam (quinine 30 grains daily for two days, mepacrine 0.3 gm daily for 5 days, a rest period of two days, then pamaquin—0.02 gm daily for 6 days). This was found to be

recommendation was made to omit quinine and pamaquin from routine treatment which should consist of mepacrine only with a moderately large initial dose followed by suppressive mepacrine treatment.

not in the original abstracts

This team (p. 396) after studying various synthetic antimalaria drugs proceeded to investigate the action of 3349 first on *P. gallinaceum* and then on human infections acquired in West Africa or the Mediterranean. Patients with subtertian malaria were given 0.2 gm orally thrice daily for 7 days. Some had no relapse during the ensuing 3 months of observation, others relapsed and were given a second course to be ineffectual. Sexual forms of the parasite. The results are comparable with those of 3349 though at times causing colic and diarrhoea is preferred to mepacrine by many because it does not produce the yellow staining of the skin associated with the latter.

Clinical trials of the compound 4888 (Paludrine), which was developed from the earlier substances, showed very great success in the treatment of *P. vivax* and *P. falciparum* infections, and the drug was therefore sent to the Australian Army Research Unit for extended trial under the exacting conditions developed by that unit, under the Directorship of FAIRLEY (p. 527). With *P. falciparum* infection 25-100 mgm. were given daily, and the drug appeared to be a true causal prophylactic. With *P. vivax*, 100-300 mgm. daily suppressed the infection but did not prevent attacks after the drug had been discontinued. 100 mgm. daily protected against mixed sporozoite infections with *P. vivax* and *P. falciparum* in volunteers, even when they were subjected to strenuous

300 mgm. daily for ten days; in *P. vivax* infections dosage was varied from a single dose of 100 mgm. to 1.0 gm. daily for a fortnight. Relapses were observed after a period of freedom up to 86 days. Gametocyte production in *falciparum* infections is unchecked by the standard course of paludrine. Its mode of action is to affect the amoeboid forms, or at a later stage in schizogony. It has a powerful action on the maturing schizonts of *P. vivax*.

When paludrine is being given it is important to know the amount present

paludrine. Its suppressive effect is almost perfect; 25 mgm. daily completely suppresses malignant tertian, and 100 mgm. suppresses benign tertian. A single dose of 100 mgm. controls a clinical attack so that relapse does not take place for several weeks. In man, toxic symptoms may follow doses of 500 mgm. taken twice a day for

clinical cure, but not a certain radical cure. Paludrine does not destroy gametocytes but renders them non-infective for mosquitoes for several days, probably by action of the drug while in the stomach of the mosquito.

Other Drugs.—A new drug, *Chloroquine*, SN 7618, a quinoline derivative, has been synthesized in the United States (p. 708) and has proved to be active in infections due to *P. vivax* and *P. falciparum* and in avian malaria. It is readily absorbed and slowly excreted. In properties it resembles mepacrine and its toxicity is similar, causing transient headache, visual disturbances, gastrointestinal upset and pruritus. In benign tertian malaria it is an effective suppressant, but it is not curative or prophylactic. In malignant tertian it is effective in acute attacks and can bring about cure when given in doses of 0.6 gm. days.

found controlled the symptoms generally better than either atebirin or quinine. In some patients it gave rise to general or localized pruritus, but this was usually transient. Relapses were slightly fewer than with atebirin or quinine. The general conclusion is reached that chloroquine is safe and highly effective and, judging by their results, superior to quinine or atebirin.

Vitaquine.—Success from the use of Vitaquine was reported by PERRET-GENTIL (p. 200). Vitaquine is a mixture of cinchona alkaloids with a vitamin C preparation.

TONKIN and WORK (p 1012) tested two Chinese plants with reputed anti malaria properties namely *Fraxinus malacophylla* and *Dichroa febrifuga* (chang shan) and MUKERJI (p 1012) tested the former of these and also two Indian plants *Alstonia scholaris* and *Caesalpinia bonducella*. The conclusion arrived at was that all four had a slight febrifugal action but no true antimalarial effect and consequently that their reputations rested solely on the former of these actions.

HEIDELBERGER and his colleagues (p 816) describe in detail their mode of

tertian infection they have also been tested for prophylactic properties and use

inf
ant

conferring any protection

SPECTOR HAVILAND and COGGESHALL (p 823) having observed that

malaria infection the results indicated that they were of no value

A report that two Indians suffering from kala azar and relapsing malaria had no relapse while under prolonged treatment with urea stibamine prompted

malaria properties but its action is inferior to and slower than that of either quinine or atabrin and it is followed by a much higher relapse rate

Suppression

DUNCAN (p 708) who was with the United States Sixth Army Training Centre in Australia investigated mepacrine as regards its suppressant activity he found that success depended on the thoroughness of supervision and that 0.1 gm daily on six days a week sufficed. Under combat conditions when

called the atypical lichen planus syndrome recorded in New Guinea, Assam and North Burma. Violaceous or eczematoid plaques appear at first localized to the dorsa of the hands and feet and to the side of the neck, later becoming more widespread and even generalized. Secondary pyogenic infection is common. Other cases of atabrin dermatitis have been noted by WHITEHILL.

1

damage

The Australian Army Medical Research Unit under the directorship of FAIRLEY (p 628) tested the suppressive value of M 4430. This drug corresponds

closely to paludrine, M 4888, one H being replaced by CH_3 . Doses of 200 mgm. were given daily: malaria was temporarily suppressed but developed at periods ranging between 16 and 59 days after the treatment was stopped; this is interpreted as indicating that the [postulated] exoerythrocytic forms were not eradicated, but that M 4430 acts as a partial prophylactic against *P. vivax* infections—at least as regards the New Guinea strains.

In connexion with suppression, reference may again be made to the report of MOORE (p. 4) on coloured and white American troops in Liberia, already mentioned in the Epidemiology section of this summary.

Control.

BEKLEMISHEV, SHLENOVA and ORLOV (p. 1112) have undertaken an important study of the area to be covered by antilarval measures against malaria carried by *A. maculipennis*. The rôle of each concentric belt around the settlement upon the mosquito density of it. Estimation was made of the density of larvae in an area with a radius of 3 kilometres from the settlement, after which antilarval measures were undertaken in all breeding-places within three concentric zones in succession, each one kilometre in width. A centrifugal increase was noted in the second zone, but the density in the third zone was unable to keep pace with the losses caused by antilarval treatment of the first two. After treatment of the first zone, the mosquito density of the settlement was reduced by 82.4 per cent.; after treatment of the second zone it fell to 0.3-0.4 per cent. of the original density. Thus, larval destruction within a radius of two kilometres almost completely stopped the influx of active female mosquitoes into the settlement. Hence, a clearance of two kilometres is sufficient, but, in case some had merely been deflected to neighbouring villages or to cattle in the vicinity, it would, in some cases at least, be advisable to cover a radius of three kilometres.

The Public Health Department of the Portuguese Ministry of the Interior (p. 903) has issued a series of publications dealing with antimalarial work in that country.

FELTON, BARNES and WILSON (p. 308) have put on record the measures adopted in parts of the U.S.A. to protect those in non-endemic areas from infection present in men returned from malarious regions abroad. Mobile malaria units have been established, each unit consisting of a station wagon and a 1½ ton truck to carry material for entomological surveys, larvicidal operations, minor drainage, clearing and cleaning, and sprays for killing mosquitoes. Control measures are carried out wherever human carriers and the insect vector are concentrated. Fifty-seven areas were surveyed during 1943-44. *Anopheles quadrimaculatus* was present in 32 of them and the densities were generally high.

In spite of difficulties, such as shortage of antimalaria drugs, inadequate transport and obstacles to recruiting labour for carrying out antimalarial measures, COLLIGNON (p. 307) reports that the malaria situation in Algiers remained "not unsatisfactory"; in fact, the indices of infection were somewhat lower than in the two preceding years.

MAGOON (p. 877) has written a book in which, after presenting information on the epidemiology of malaria in the Caribbean area, he relates in some detail the engineering aspects of malaria control in mangrove swamps, flood plains and seepage areas, with an account of the necessary equipment and materials.

RIBBANDS (p. 1014) reports on the use of DDT in oil on running water, not as a continuous spray [see also p. 409], but in discrete applications; the anophelines were of Indian species. He found that in narrow streams, 2 ft. or so across and flowing 12-15 ft. per minute, 10 cc. of 5 per cent. DDT in waste

through a distance of
of 75 ft per minute
cent) strength gave
9) and also DEONIER

and BURRELL (p 410) in America have carried out more experiments the former applying DDT in oil from an oil can the latter in solutions or emulsions or as

superior 0.01 cc per sq yard killed 100 per cent of the larvae and the effect lasted for two days 0.02 cc killed 80-100 per cent and lasted for 2-3 days whereas this quantity of the former emulsion was entirely ineffective and as much as 0.5 cc per sq yard was needed to bring about a kill of 90-100 per cent but the effect lasted for ten days

COTTAM and HIGGINS (p 1014) investigated the effect of DDT in solution or emulsion on fish and wild life in the United States they found it lethal to crabs and fish and they therefore advise against its being used in streams lakes and coastal bays but each case must be considered on its own merits because if this generality were followed the use of DDT in mosquito control would be sadly hampered for in many places where DDT is needed aquatic life is negligible or unimportant

JOHANSON and EASON (p 1111) report promising results from the use of pellets of DDT in water collections in America The pellets were prepared by melting paradichlorobenzene and adding solvents containing DDT and emulsifiers and DDT in crystalline form They give in their paper seven formulae During the first six weeks the larvae present were markedly reduced

entering the rice fields will reduce the breeding of *A. quadrimaculatus* (0.2 ppm will suffice for Culicines) but will not eradicate them the rice is not injured thereby ANANIAN and his fellow workers (p 13) have shown that mosquitoes in rice-fields in the Caucasus can be controlled by intermittent irrigation—flooding for 8 days and drying for 5 days

DDT as a mist from an aerosol cylinder has been found by JONES and his colleagues (p 530) to be lethal to larvae of *A. quadrimaculatus* to a distance of

lethal dose before they leave it again and the chain of transmission is thus broken Dispersion from aircraft presents difficulties when in a concentration above 5 per cent in inert dust it tends to cake and the use of kerosene as a diluent entails a heavy load but 15-40 per cent solutions in certain poly methyl naphthalenes sprayed from a special apparatus gave 90 per cent kills over a swath 60-300 ft wide with doses of DDT less than 0.03 lb per acre

SCHARFF *et al* (p 203) in reports from the Medical Advisory Division South East Asia Command have recorded the results of the use of DDT for indoor

spraying and air-spraying trials. For details the originals should be consulted, but it may be stated here that DDT remaining in vegetation killed mosquitoes newly hatched and those coming to oviposit.

SIMMONS and his staff (p. 104) tested the effectiveness of DDT in control of *A. quadrimaculatus* in a series of laboratory and field experiments, using various strengths of DDT in various solvents—"Triton X-100," "Duponol OS," "Arctic Syntex A" and others. When DDT is used as a larvicide, 90-95 per cent. of the kill takes place within the first hour and the residual effect wears off in a few days, though the subsurface water remains toxic to larvae for longer. For other details those interested should consult the original paper.

CAMBOURNAC and SIMÕES (p. 306) tested the larvicidal potentialities of the two DDT preparations Neocid and 7013 Geigy [the composition of this is not given]. The results of their action were not consistent and any larvicidal action was of brief duration.

DEONIER *et al.* (p. 101) found that, comparing DDT as a dust with Paris green, 0.005 lb. of the former per acre gave 100 per cent. kill of larvae of *A. quadrimaculatus* in 48 hours, while 0.1 lb. of the latter gave only an 85 per cent. kill in the same time. Moreover, the former was resistant to sinking, even after rain. Such were the results in laboratory trials. In the field 0.05-0.1 lb. of DDT per acre gave 100 per cent. kill, but had no residual action. For residual effect as much as 1-2 lb. per acre and a 20 per cent. mixture, were needed. Colloidal suspe
three months,

PRICE and I
very effective :
Footmac River.

GAHAN, LINDQUIST, TRAVIS and MORTON (p. 99) carried out series of tests on the control of *A. quadrimaculatus* by DDT, first in the laboratory, then in small-scale, later in large-scale field work. They found that concentration of chemical in the spray used does not materially affect the toxicity of the residue, so they used 2.5 per cent. as a standard. Unpainted surfaces treated with this remained lethal for as long as a year, but the "knock-down" time increased from an initial two hours to as much as five hours in films 32 weeks old. On painted surfaces 100 per cent. kill was recorded 32 weeks after the application of 50 mgm. per sq. foot, if the surface was coated with cold water casein paint. On oil paint surfaces the duration was much shorter, not more than a week, and the knock-down after five hours was reduced to one-fourth. Anopheline counts in houses, for four months after the end of treatment, compared with adjacent control areas, showed a reduction of 99 per cent. when 208 mgm. per sq. foot had been used and 91 per cent. when 56 mgm. had been applied.

Control in rural areas, houses occupied by plantation negroes, is reported upon by KNOWLES and SMITH (p. 710). A stock solution containing DDT 23 per cent., xylol 71 per cent. and Triton X-100 6 per cent. was prepared and diluted with water to give emulsions of strengths 5, 2.5, and 1 per cent. DDT. The percentage reduction of *A. quadrimaculatus* one to two months later was 88 with 5 per cent., 74 with 2.5 per cent., and 66 with 1 per cent.

Senior WHITE (p. 306), in the hyperendemic Jeypore Hills, compared the results of house spraying with DDT and with pyrethrum extract, the local infection being by the *fluvialis* group. He concludes that DDT is more effective, and very much cheaper, than pyrethrum.

DEONIER and JONES (p. 531) have compared a new compound, TDE, with DDT as regards toxicity to larvae of *A. quadrimaculatus*. TDE contains two chlorine atoms in the ethane nucleus, instead of the three of DDT. TDE appeared to be slightly the more toxic.

Benzene hexachloride has been tested by LOZANO MORALES (p 205). Excellent results were obtained by using it in powder form one per cent mixed with road dust in *Anopheles* breeding places. It can also be used as a suspension in water.

THOMSON (p 93) has written a paper very informative statistically and geographically on the breeding places and control of *A. melas* in coastal parts of Sierra Leone. Breeding occurs in association with *Alcornoquea nitida* and

subside some of the eggs are left in pools in which they develop others are stranded in mud where they survive until the next tide floats them when they immediately hatch out. Thus output of adults is periodic occurring in waves after the end of the spring tides. In *Paspalum* areas egg laying occurs at any

have proved quite successful.

VINCKE and PARENT (p 307) procured marked reduction of *A. gambiae* the chief vector of malaria in Stanleyville by oiling filling and drainage. But there has been no diminution in the parasite rate in children.

MUSPRATT (p 704) finding that fungi of the *Coelomomyces* genus are parasitic in larvae of *A. gambiae* in Northern Rhodesia causing a mortality of some 95 per cent of them suggests their possible use in the biological control of this vector.

According to BERBERIAN (p 1105) of the eight species of *Anopheles* captured in Syria and Lebanon the important vectors are *A. sacharovi*, *A. superpictus*

breeds in wells. For control the hiding places of the two former should be sprayed with 5 per cent DDT emulsion in December or January and March followed by antilarval measures. For controlling the third wells and cisterns should be sprayed every two months.

GILLETTE (p 824) reports that *A. aquasalis* and *A. bellator* are the chief malaria vectors in Trinidad and the former of these in Tobago. Animal barriers are serviceable against *A. aquasalis* but effective control has been obtained by construction of a culvert with a sea head to keep the mouths of small streams open and by automatic flushing siphons. The breeding places of *A. bellator* in Bromeliads were satisfactorily dealt with by spraying with

protection

PHILIP RAMAKRISHNA and RAO (p 203) observed in Madras that spleen rates were higher in boys than in girls and ascribed this to the fact that the girls anoint themselves with turmeric and vegetable oils. Experimentally in cages turmeric and mustard oil repelled hungry *Anopheles* of several species.

but, as BUXTON points out, it is not safe to conclude from cage experiments that the same means would be effective under ordinary living conditions.

Therapeutic and Inoculation Malaria.

Inoculation malaria is usually much more severe in white than in coloured patients, but convalescents from artificially induced *P. falciparum* infections usually exhibit clinical tolerance when re-inoculated with a heterologous strain; there is a shorter period of clinical activity. White patients re-inoculated thus react like coloured patients on primary inoculation—one wave of trophozoites followed by a wave of gametocytes. Gametocyte production is often greater after heterologous re-inoculation, in the case of coloured patients, than it was after the primary infection. Hence, it would seem that the immunity acquired during convalescence from a *P. falciparum* infection has an appreciable heterologous value (BOYD and KITCHEN, p. 1003).

CRUCA and his colleagues (p. 292) kept under observation for 4 to 14 years 41 patients who had been subjected to malaria therapy. Their immunity was
istence of the parasites, by transfusion of
or, directly, by a fresh injection of virulent
most lasting immunity, *P. falciparum* the
shortest. The same authors (p. 290) studying *P. falciparum* gametocyte carriers, some being cases of natural infection, others artificially infected with virulent blood or with sporozoites, found that the infectivity of the naturally infected carriers was higher than that of the others, the vitality of the gametocytes of the naturally acquired strains appeared to be much higher than those of the therapy strain.

BOYD (p. 289) tells of difficulties in maintaining propagation of *P. falciparum*, even when sporozoites are present in the mosquitoes, but they may fail to infect. Resistance on the part of the patient does not account for it, for subsequent inoculation may succeed; it is not due to age of the sporozoites, for quite young ones may fail. A possible explanation is that if the patient from whom the mosquitoes gain infection has recently taken quinine, this may impair the vitality of the resulting sporozoites.

A. quadrimaculatus allowed to feed on patients with *P. vivax* infection acquired in the Pacific showed an infection rate of 11.8 per cent. (WATSON, p. 290), and the highest rate was obtained in mosquitoes which had fed on patients who had parasitic relapse but no fever.

KAPLAN, READ and BECKER (p. 1110), as a result of their investigation of the action of Thiochismol on blood-induced infections with *P. malariae*, found the drug of value in reducing the frequency of paroxysms and in controlling irregular cycles, it should, therefore, aid neurosyphilitics to tolerate a full course of therapy with this parasite.

Finally, FREDERICKS and HOFFBAUER (p. 97), studying the hepatic function in patients undergoing malaria treatment, conclude that such therapy is contra-indicated where there is clinically manifest disease of the liver.

Malaria other than Human.

Sporozoites of chicken malaria rapidly lose vitality when kept at room temperature. BRACKETT and HUGUES (p. 15) have found that to retain vitality the ground-up mosquito material should be chilled as soon as possible and kept in an ice-bath during the inoculations; infections produced are then more uniform. Exposure to room temperature even for 15 minutes probably results in marked injury to the parasites.

P. lophurae infection in chicks is more severe when the birds are on a diet deficient in folic acid, according to SEELER and OTT (p. 412), but passage through chicks on a deficient diet does not increase the actual virulence of the

plasmodium because on inoculation into normal chicks on an adequate no enhancement of virulence could be detected.

WOLFSON (p 716) has shown that rapid passage is a satisfactory method of adapting a parasite to a host only slightly susceptible on first transfer. A *P. relictum* sent to America from England in young canaries produced a mild infection in ducks at first but increased markedly in virulence after 40 semi-weekly transfers.

COURSTON (ANTRELL and HUFF (p 205) in an article on the distribution, localization of sporozoites and pre-erythrocytic stages in the tissues of infected with *P. gallinaceum* have shown that dispersal of sporozoites probably takes place by way of the blood stream.

SPECK, WOLFFER and EVANS (p 1116) contribute another paper to the series dealing with the biochemistry of *P. gallinaceum*. This time they are concerned with the mechanism of pyruvate oxidation in the parasite. For more detail on the subject the reader is referred to previous issues of *Bulletin* 1938: 35 709; 1940: 37 190 509; 1942: 39 397 742, 1943: 40 674 and more particularly 1945: 42 448 967. The same authors have also written on the nitrogen metabolism of this plasmodium.

WOLFSON (p 714) investigated the question of survival of three species of *P. relictum* in blood. The results showed that the first named survived more readily than the others.

Inoculation into ducks produced a lower degree of parasitaemia than in controls inoculated with unchilled parasites but one to two subsequent passages usually restored the virulence of the former.

JACOBS (p 206) after a series of attempts to increase the resistance of ducks to infection by *P. lophurae* by previous injections of materials containing the Forssman antigen or hapten prepared from guinea-pig kidney, horse kidney and sheep erythrocytes met with practically no success. The results were largely negative. As the result of experiment on ducks ROSTORFER and RIGDON (p 309) believe that anoxia plays an important part in bringing about death from acute malarial infections.

Studies of some importance have been taken up regarding immunity in a (and to a less degree in monkey) malaria. Thus HUFF and COURSTON have published an informative paper on the relation of natural and acquired immunity of chickens, geese and ducks to the erythrocytic and merozoitic stages of *P. gallinaceum* and *P. relictum*. The work cannot be further abstracted here, those interested should turn to the full abstract in this *Bulletin* (p 1) or to the original.

TALLAFERRO, TALLAFERRO and SIMMONS (p 629) have demonstrated that irradiation in *P. lophurae* infections on the day of injection results in a more severe infection. At other times it causes only slight relapses. The effectiveness of the X-rays varied with the age and susceptibility of the chickens; the specific parasite (*P. gallinaceum* was also tested) the stage and intensity of the infection. These variations seem to be related to natural and acquired immunity which is modified by the destruction of lymphocytes brought about by irradiation.

Antibody production is increased and more durable if the antigens are emulsified with Falsa (a lanoline-like substance) and paraffin oil. FREUND (p 311) has attempted to immunize young ducks against *P. lophurae* subsequently *relictum* monkeys against *P. knowlesi*. Details of their experiments are too complicated to be given in the present summary but the conclusion arrived at was that the ducks so treated had developed considerable resistance to subsequent infection with *P. lophurae*. In the case of *P. knowlesi* infection the parasitaemia was modified and fatal results of infection prevented.

Advances have been made in the treatment of avian malaria, and DAVEY (p. 712) has investigated the activities of various drugs, according to the route of administration, intravenously or orally, and also the use and value of avian malaria for discovering and testing drugs for the treatment and prevention of human malaria.

MARSHALL, P. B. (p. 97) found, by testing their effect on *P. gallinaceum* infections, that quinine degradation products, for example an extract in which the quinine had been metabolized, lost thereby their antimalarial properties. DEARBORN and MARSHALL, E. K. (p. 404) have also investigated the degradation products of quinine in animals, when administered by the drug diet method [see this *Bulletin*, 1943, v. 40, 223] or intravenously to ducks and chicks, and by the latter route to dogs. The authors conclude that there are probably at least two degradation products to be found in the duck after administration of quinine, and that the degradation is similar, qualitatively, in the other animals.

FUNKE, BOVET and MONTÉZIN (p. 713) have synthesized a quinoline derivative 2236F. Tested on canaries infected with *P. relictum* it had a therapeutic index of 1/50. The authors suggest that, as its toxicity is low, it should be tried clinically in human malaria.

Sulphonamide drugs vary in their absorbability and in their action upon the malaria parasites of birds. The concentration in the red cells is usually higher in the canary than in the chick, but the action is much less. A blood concentration of 10 mgm. sulphadiazine per 100 cc. was found to be very active against *P. gallinaceum*, but 60–100 mgm. per cent. were needed to suppress *P. cathemerium*, and the degree of antimalaria activity in chicks is correlated with the height of the blood concentration curves (MARSHALL, P. B., p. 15).

BRACKETT, WALETZKY and BAKER (p. 411) have determined that the rate of action of slowly acting antimalaria drugs, as sulphadiazine, increases in proportion with the slowness of the rate of growth of the organism, a matter which may have an important bearing on chemotherapy. The same investigators (p. 713) have compared the action of sulphadiazine with that of quinine on *P. gallinaceum*. Whereas quinine acted almost immediately, arresting development of the parasite, with sulphadiazine the first signs of retardation of development were seen between the 12th and 24th hours, and the first treated generation of parasite went on to segmentation and invasion of fresh erythrocytes. Thus, in chickens treated with quinine, there was never any increase in the number of parasites in the blood, whereas with sulphadiazine there was a fourfold increase in the first two days.

BOVARNICK, LINDSAY and HELLERMAN (pp. 824–6) have reported on their studies of the metabolism of *P. lophurae*, undertaken to obtain information on the mode of action of antimalarial drugs. They found that atehrin inhibits glucose oxidation in parasites depleted of substrate and its action may be due to interference with some phosphorylation reaction before glucose can be utilized. Adenylic acid was found to be antagonistic to the action of atehrin.

SEELER, MALANGA and PIERSON (p. 309) tested the action of streptomycin on *P. cathemerium*, *P. lophurae* and *P. gallinaceum* in Leghorn chicks, infected by intravenous inoculation of infective blood and, in the case of *P. gallinaceum*, of sporozoites also. The doses given were 25,000 to 400,000 units intramuscularly per kilo. body weight per day. The streptomycin was found to exert a slight suppressive action on infection induced by sporozoite inoculation, but none in blood-inoculated infections.

EXEMPLARSKAYA (p. 1113) finds that the treatment of monkeys infected with *P. inui* by means of "cytotoxic antireticular serum", prepared by immunizing an animal with an emulsion of the reticulo-endothelial tissue of

BROWN, M. & RENNIE, J. L. Suppression of Benign Tertian Malaria with Mepacrine : an Investigation of 247 Cases of Apparent Failure. *Ann. Trop. Med. & Parasit.* 1946, July, v. 40, No. 2, 190-98, 2 figs.

These observations concern 247 cases of *P. vivax* malaria that occurred in Italy among men who were supposed to be taking 0.1 gm. of mepacrine a day. One hundred and seventeen patients were suffering from a primary attack ; 100 were suffering from the second to fourth attack ; 18 from the fifth to seventh attack ; and 13 from the eighth or more. Seventy-three per cent. of the patients admitted that they had not taken mepacrine regularly. The mean concentration in 200 of these patients was $7.5 \mu \text{gm./l,000}$

In a control group of healthy persons who were known to have taken the full suppressive dose of mepacrine it was $25.3 \mu \text{mg./l,000 ml.}$, S.E. 1.92. The low plasma concentration in the malaria cases was not due to an abnormal excretion of mepacrine by the kidneys. Failure to take the drug regularly was the chief cause of its apparent failure to suppress malaria.

Norman White.

LEVINE, H. D. & ERLANGER, H. Atabrine and the Electrocardiogram. *Amer. J. Med. Sci.* 1946, Nov., v. 212, No. 5, 538-40.

"In a series of 179 individuals atabrine in therapeutic and suppressive doses had no significant effect on the electrocardiogram. Abnormalities observed in patients receiving atabrine can be attributed to other causes."

WILSON, D. J. Eczematous and Pigmentary Lichenoid Dermatitis : Atypical Lichen Planus ; Preliminary Report. *Arch. Dermat. & Syph.* 1946, Oct., v. 54, No. 4, 377-96, 10 figs.

This report does not add much new material to our knowledge of this malady, but the histological photographs and other illustrations are of considerable interest. The disease in "one Japanese, several

and another, cause, but is uncertain whether it is the same. vitamin A may be a predisposing cause. He classifies the eruption as being "dry" or "exudative" ; 80 per cent. of the cases from the South-West Pacific area were of the latter type. Like others, Wilson has noted secondary atrophic changes at the sites of nodular lesions and believes the pigmentation which characterizes the eruption eventually disappears ; he claims to have seen numerous complications "including universal exfoliative dermatitis, hepatitis, atypical pneumonia, polyncuritis, heart bundle-branch block, pericarditis, ascites, a low level of total protein in the blood, reversal of the albumin-globulin ration, edema and anasarca, simple anemia and aplastic anemia. In two patients of this series there developed pulmonary tuberculosis".

If mepacrine was administered daily in doses of 0.3 or 0.65 gm. to patients exhibiting dry nodular lesions the eruption and the pruritus were aggravated. Not all eczematous eruptions were aggravated when the drug was taken orally. Patch tests with various dilutions of mepacrine appeared to be positive only on those areas where the eruption had been present.

The paper concludes with an interesting comment on the similarity between atypical lichen planus and the toxic manifestations which may occur after the administration of oxophenarsine hydrochloride or solutions of potassium arsenite U.S.P., for both the arspenamines and mepacrine are said to contain benzyl radicals.

R. M. B. MacKenna.

PAGE S G Jr & McCALL J V Jr Delay in diagnosing Malaria after Sulphadiazine Therapy Two Case Reports. *Southern Med J* 1946 Sept v 39 No 9 728-31 2 charts

patients The failure to make prompt diagnoses was directly attributable to the administration of sulphadiazine which had freed the peripheral blood of parasites without effecting a cure
Norman White

PERRET GENTIL A Les injections intra veineuses de calgluquine dans le traitement du paludisme [Intravenous Injection of Calgluquine in the Treatment of Malaria] *Acta Tropica* Basle 1946 v 3 No 3 193-210 3 figs [12 refs]

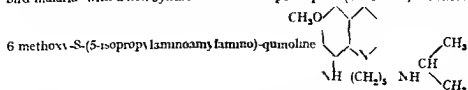
This preliminary study relates to the treatment of 38 cases of relapsing malaria mostly *P. vivax* infections with intravenous injections of Calgluquine. Calgluquine (Sandoz) is a solution 10 cc of which contains 60 cgm of quinine gluconate mixed with calcium. The author speaks highly of the results obtained. Thanks to the action of the calcium intravenous injections of Calgluquine are much better supported than intravenous injections of quinine alone. No untoward symptoms ever arose. There was a rapid action on the malaria infection and treatment was followed by considerable improvement in the general condition of the patients. Treatment can be continued over long periods if necessary. Doses of 15 cc in 24 hours were well tolerated. The injections caused no serious alteration either of blood pressure or of pulse rate. Several patients with experience of many varieties of antimalarial treatment expressed a preference for Calgluquine.
Norman White

JOHNSTONE R D C Relapsing Benign Tertian Malaria treated with 4430
Ann Trop Med & Parasit 1946 Dec v 40 Nos 3-4 330-32

A six months follow up on 97 patients treated with 4430 compared with a similar number of cases treated with the standard quinine and pamaquin treatment showed a relapse-rate of over double that of the latter treatment

LOEB R F Activity of a New Antimalarial Agent, Pentaquine (SN 13,276)
Statement approved by the Board for Coordination of Malarial Studies
J Amer Med Ass 1946 Oct 12 v 132 No 6 321-3

This report deals with extensive tests carried out in America on human and bird malaria with a new synthetic substance pentaquine (SN 13,276) which is



Tests were also made on its pharmacological and toxic properties in animals and man. The diphosphate of over 95 per cent purity which forms yellow

needles and is moderately soluble in water, has been used in these tests. In pharmacological studies on laboratory animals it was found that the drug is rapidly and completely absorbed from the gastrointestinal tract. Only about 10 per cent. of drug administered was recovered in the urine. In plasma, peak values were reached within two hours after administration and the amounts present were negligible after 6 to 8 hours. Estimations were made by coupling with diazotized sulphanilic acid to give a coloured substance. There was no accumulation in tissues after long periods of treatment, the concentrations present being much lower than is found with atabrin or chloroquine [this *Bulletin*, 1946, v. 43, 708] and, in general, the behaviour of the drug resembled that of pamaquin. The findings point to the fact that pentaquine is largely metabolized in the animal body. In man the behaviour of the new drug also resembled that of pamaquin. Great variations in plasma level occurred in persons receiving the same doses. [This fact has also been established for atabrin.]

In acute and chronic toxicity tests, pentaquine was shown to be less toxic than pamaquin; similar symptoms, such as methaemoglobinemia and stomach cramps, were produced by each. Certain nervous symptoms produced in dogs by pamaquin were not noted after pentaquine, but both drugs affected the heart and circulatory system. In a quantitative sense, quinine increased the toxicity of the drug in rats and monkeys. In man also the toxic effects were similar to those produced by pamaquin, with certain qualitative and quantitative differences depending on the dosage, which in the tests ranged from 15 to 180 mgm. of base per day. Severe anemia was met with in one volunteer.

In infections with *P. gallinaceum* and *P. lophurae*, the drug was respectively 80 and 128 times as active as quinine, and several times more active than pamaquin. Clinical studies were made with the Chesson strain of *P. vivax*, which shows a high relapse rate. In prophylactic experiments in which non-immune patients were submitted to the bites of infected mosquitoes, pentaquine effected suppression in some cases when a toxic dosage of 120 to 180 mgm. of base was given daily for 8 days. In curative tests, primary attacks in non-immunes resulting from the bites of 10 infected mosquitoes and also primary and secondary relapses were treated every four hours for 14 days with the result that individual attacks were terminated but relapses were not always prevented even by a high dosage. However, treatment of the third relapse prevented further attacks in 35 patients. Complete eradication was, however, effected in 16 out of 17 cases when the drug was administered daily in 60 mgm. doses combined with 2 gm. quinine, a result which compares favourably with those obtained experimentally when pamaquin is used with quinine. Pentaquine in conjunction with quinine appeared to be less effective when patients were heavily infected through being bitten by 10 infected mosquitoes on three alternate days. The following recommendations are made with regard to dosage:—

"A. *In Suppression and Prophylaxis.*—The toxicity of pentaquine is too great to warrant its use in prophylaxis or prolonged suppression of malaria.

"B. *In Cure of Malaria due to Plasmodium Vivax.*—A daily dose of 60 mg. base (equivalent to 80 mg. of diphosphate) and 2 Gm. of quinine administered concurrently in divided doses every four hours for fourteen days is sufficient to produce radical cure of severe infections due to *P. vivax*. The daily dose of 60 mg. base should not be exceeded. Longer therapy may be necessary when nonimmune persons have been unusually heavily seeded and have not had previous suppressive therapy. Pentaquine (SN 13,276) should be administered only under close medical supervision, preferably during hospitalization. The toxicity of the drug in Negroes and persons of mixed racial extraction and the safe therapeutic dose for children are at present undetermined." J. D. Fulton.

FAIRLEY, N. H. Malaria in the South-West Pacific, with special reference to its Chemotherapeutic Control *Med J Australia* 1946 Aug 3 v 2 No 5, 145-62 10 graphs

the ... and the ultimate triumph

the Royal Society of Tropical Medicine and Hygiene (this *Bulletin* 1945, v 42 630)

In 1944-45 malaria had ceased to be an operational problem in all areas but or Austr

tion control measures were inadequate was the Aitape Wewak area of New Guinea. Some 27.6 per cent of the total force engaged in this area developed overt malaria. *P. falciparum* was found in 78 per cent of these overt cases. There is reason to believe that during the eleven months of exposure to infection in this area not less than 90 per cent of the force

sant. Very thorough cases of *P. vivax* mal... of the *P. falciparum* cases was defective mepacrine discipline. About one third of the overt cases of malignant tertian malaria appeared to have been caused by infection with a relatively mepacrine resistant strain of *P. falciparum*. In persons infected with this strain 0

pressing malaria would not always mepacrine fast. It seemed that the quality of mepacrine resistance was in the making rather than a fixed biological characteristic of a local strain. Sub-optimal dosage may have been responsible for its development. No increased resistance to antimalaria drugs other than mepacrine and santoquin was exhibited by this strain. An adequate summary of this important paper is not possible.

Norman H. Aile

SELBY, C. H. Malaria in the South-West Pacific. Additional Facts about Malaria Control in the Australian Military Forces [Correspondence] *Med J Australia* 1946 Aug 24 v 2 No 8 266-7

The word 'additional' in the title of this contribution refers to Brigadier N. H. FAIRLEY's article (see above). The author describes the careful manner in which measures of personal prophylaxis—mosquito nets and repellents

New Britain areas which compared so favourably with Wewak, the suppressive dose of mepacrine being taken was in many cases more than the official one tablet a day. Moreover in the Wewak area it was never possible to arrange a DDT spray before or soon after the arrival of troops. In some other areas

this was done. Variations in malaria incidence may have been caused by several variable factors and discipline may not have been a factor at all.

Norman White.

FAIRLEY, N. H. *et al.* Atebrin Susceptibility of the Altaipe-Wewak Strains of *P. falciparum* and *P. vivax*—a Field and Experimental Investigation by L.H.Q. Medical Research Unit, Cairns. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1946, Dec., v. 40, No. 3, 229-73, 8 charts.

This paper describes in detail the investigations that were carried out with atehrin-resistant strains of *P. falciparum* obtained from soldiers with naturally acquired infections in Altaipe-Wewak, New Guinea. Nine selected patients were sent by air-ambulance to Cairns, selected for their tendency to recrudescence after standard quinine, atehrin, plasmoquine treatment or for some other reason such as hyperinfection. The strain or strains obtained from seven of these patients were atypical inasmuch as the infections they caused in experimentally infected volunteers taking 0.1 gm. atehrin daily were not suppressed, though the suppressive medication was continued for 28 days after the last exposure to infection. An increase of atehrin to 0.2 gm a day was not always effective. Four volunteers so infected with atehrin plasmoquine followed by 0.1 radically cured. Paludrine in doses plete causal prophylactic against all strains.

Such atehrin-resistant strains of *P. falciparum* were encountered nowhere else in New Guinea or New Britain and only accounted for a minority of infections in the Altaipe-Wewak area.

In one case, a strain lost its atehrin-resistance after the fourth passage through mosquitoes. The quality of atehrin-resistance may have arisen suddenly as a mutation in soldiers taking atehrin or may be an inherent biological characteristic of a geographically limited strain. It was first demonstrated in an individual who was avoiding taking atehrin, it might thus be a result of prolonged suboptimal dosage.

No evidence of atehrin-resistant strains of *P. vivax* was obtained.

Norman White.

KNOWLES, F. L. & SMITH, C. S. Duration of Toxicity of Several DDT Residual Sprays under Conditions of Malaria-Control Operations. *Pub. Health Rep.* Wash. 1946, Dec. 13, v. 61, No. 50, 1806-10.

"To determine the duration of toxicity for mosquitoes of several DDT residual sprays, 72 houses were sprayed with 4 formulas of DDT spray at the beginning of the 'malaria season,' on about June 1, and were inspected at 6 different periods until October 1, 1945. Twenty-five unsprayed houses in the same area were inspected at the same time.

"For the period of the 'malaria season,' in this region a period of 17 weeks, the once-sprayed houses harbored significantly fewer mosquitoes than the unsprayed houses.

"Little difference was found in the duration of toxicity of the four formulas of DDT residual spray employed, except for the formula used in the houses in group C, which was statistically less effective 14 weeks after spraying."

SEELER, A. O. & MALANGA, C. Effect of Boric Acid on Avian Malaria. *Proc. Soc. Exper. Biol. & Med.* 1946, Oct., v. 63, No. 1, 194-5.

FEDERATION PROC. Baltimore 1946 Sept. 5 No. 3 390-407 Symposium on Biochemistry of Malarial Parasites. Introduction [CLARK W. M.] p. 390. Enzyme Systems operating within the Malarial Parasite [EVANS E. A. Jr.] pp. 390-96 [20 refs.] Chemical and Nutritional Observations on Malarial Parasites grown *in vitro* [BALL E. G.] pp. 397-9. Metabolism of the Malarial Parasite. Action of Antimalarial Agents upon Separated *Plasmodium lophurae* and upon certain Isolated Enzyme Systems [HELLERMAN L. BOVARNICK Marianna R. & PORTER C. C.] pp. 400-405 [20 refs.] The Influence of Naphthoquinones upon the Respiratory and Carbohydrate Metabolism of Malarial Parasites [WENDEL W. B.] pp. 406-7.

The introduction by the Chairman of the Panel on Biochemistry and Member of the Board for Co-ordination of Malarial Studies, National Research Council of America, reviews briefly the researches described below which represent some

might be of help in the synthesis of more potent antimalarials. The wider aspect of the biochemistry of these parasites was also considered.

The first paper is an excellent summary by EVANS of the facts known about the enzyme composition of malarial parasites. In the elucidation of these facts

of parasite

system flavoproteins, proteinases and certain dehydrogenase systems play a part in parasite metabolism. Synthesis and breakdown of cholesterol and phospholipids also occurs and haemoglobin is split up. The production of

The intermediate steps in the pathway of phosphorylation have been determined in other organisms and tissues. Antimalarials have nevertheless been their tissue analogues. The author believes he attaches the greatest importance to the therapeutic agents on the

BALL and his colleagues have elaborated new *in vitro* techniques by which malaria parasites can grow and multiply. Good results were obtained with *P. knowlesi* which increased in numbers from two to elevenfold under experimental conditions within 24 hours. The medium employed contained a mixture of salts, glucose, amino-acids, vitamins, purines, pyrimidines and several other organic components. Growth and multiplication also occurred to a lesser extent in a medium which contained only glucose and *p*-aminobenzoic acid in salt solution. The acid appears to be an essential growth factor but the

nature of other such factors has not yet been determined. It is probable that others are supplied by serum and red cells present in the more complex medium.

Factors which have been made by growing washed free of serum in presence of a

It has also emerged that low oxygen tensions are necessary for *in vitro* growth, and suggests that the particular habitat of the parasite—the red cell—has not been selected on account of the higher oxygen tension prevailing there. The *in vitro* technique is also of value, in conjunction with that *in vivo*, in studying the products of the antimalarial agents.

and atebirin is due to the unchanged demonstration of the antagonism which exists between sulphadiazine and *p*-aminobenzoic acid, on other than first generation of parasites grown *in vitro*. Observations have also been made by both methods on phosphorus exchanges, glucose utilization and other chemical reactions occurring during growth.

HELLERMAN and his co-workers have investigated the mechanism of action of a number of antimalarials. Their observations were made on erythrocytic forms of *P. lophurae* both in and free from red cells as well as on isolated enzymes. It was found that phosphorylating reactions which occurred during the utilization of glucose by the parasite were interfered with by certain antimalarial agents. Data were also obtained on the combination of specific proteins with agents of this type. The oxidation of a number of substrates by erythrocyte-free parasites was observed. In the absence of added substrate, respiratory activity was negligible but was re-established by adding adenylic acid or adenosine triphosphate, which possibly allowed some intracellular substrate to be used. These parasites, when devoid of all extraneous substrate, showed a marked delay in oxidizing added glucose. The induction period was considerably shortened by fumarate, succinate, adenylic acid or adenosine. The inhibition of respiration by a number of reagents, including those with affinity for sulphhydryl groups, is recorded. Adenylic acid or adenosine were able to reverse the inhibitory action of atebirin and certain other compounds on respiration in the case of cells which had been deprived for a time of glucose. Phosphorus exchanges in cell suspensions during incubation were therefore studied. From their action on pancreatic lipase, lactic dehydrogenase and amino-acid oxidase it appeared that atebirin, quinone, sulphonamides and certain other reagents could combine reversibly or irreversibly with proteins. These observations may prove of importance in regard to enzyme activity in general.

WENDEL made early and important contributions on the respiratory metabolism of malaria parasites and in this connexion has recently investigated the activity of 3-hydroxy-1,4-naphthoquinone derivatives. It had been noted that these substances were active against *P. lophurae* infections in ducks as well as in *P. knowlesi* infections of monkeys, but were only slightly or not at all active in human malaria infections, and a number of their degradation products were found in the patients' blood. The data suggested that the compounds in question suffered different fates in the various hosts or, in their action, displayed a marked species specificity. The mechanism of their action was therefore studied on *P. knowlesi* and *P. lophurae* *in vitro*. It was found that 69 out of 76 compounds inhibited parasite respiration to a degree which paralleled their antimalarial activity *in vivo*. The agreement obtained in the two types of experiment depended largely on the nature of the substituent group in position 2 of the molecule. When the drug was active both *in vivo* and *in vitro*, the serum of treated ducks always caused inhibition of respiration *in vitro*. Certain general conclusions were reached from observations on duck red cells parasitized with *P. lophurae* regarding the factors which influence the

action of naphthoquinones. Thus an effect on respiration reversible in the early stages is caused by a suitable concentration of those compounds active *in vivo* this effect being markedly sensitive to pH changes and dependent on the concentration of the medium. The inhibition of oxygen uptake results from interference with carbohydrate oxidation normal duck red cells being influenced qualitatively in the same way as parasitized cells. A method for

original drug

[The researches discussed in the above series of papers have been regularly reviewed in this *Bulletin*. The earliest reference is for the year 1936.]

J. D. Fulton

GORDON, R. M. & HILL, M. A. A Technique for obtaining Bacteria-free Suspensions of Sporozoites from the Salivary Glands of Infected Mosquitoes. *Ann Trop Med & Parasit* 1946 Apr v 40 No. 1 113-15

The authors have devised a technique for obtaining suspensions of malarial sporozoites free from bacterial or fungal contamination. The observations were made on *Aedes aegypti* infected with *P. gallinaceum*. A lightly anaesthetized mosquito is held by the proboscis in forceps in rapidly falling drops of 75 per cent alcohol for 1½ minutes. It is then drained on two successive slips

In a table are shown the last series of dissections carried out in 46 mosquitoes. In every case the final suspension contained infective sporozoites and was

bacteria which were always present

C. M. Henyon

TREMBLEY, Helen L. *Aedes atropalpus* (Coq.) a New Mosquito Vector of *Plasmodium gallinaceum* Brumpt. *J Parasitology* 1946 Oct v 32 No 5 499-501 [11 refs.]

(56 out of 87) of the latter were positive. Comparison of the intensity of infection based on oocyst counts on 37 midguts for each species showed a greater intensity in *A. atropalpus* (111.94 ± 23.43) than in *A. aegypti* (9.75 ± 3.98).

Transmission by *A. atropalpus* was attempted on 26 chicks through three successive generations; three chicks died of undetermined cause and of the remaining 23, 20 developed infection.

ROOS, A., HEGSTED, D. M. & STARE, F. J. Nutritional Studies with the Duck. *H. S. Leeson*.

IV. The Effect of Vitamin Deficiencies on the Course of *P. lophurae* Infection in the Duck and the Chick. *J. Nutrition*. 1946, Nov. 11, v. 32, No. 5, 473-84. [10 refs.]

"The effects of nicotinic acid, thiamine, choline, and vitamin A deficiency on the course of *P. lophurae* infections in chicks and ducklings are reported.

"In chicks, vitamin A deficiency appears to cause a somewhat milder infection and choline deficiency may have the opposite effect. Thiamine deficiency appeared to have no influence on the infection. Nicotinic acid deficiency resulted in a much more severe infection. The percentage of parasitized cells as from four to five times greater in the deficient birds. Both deficient and undeficient birds were able to clear the blood stream of parasites in approximately the same length of time.

"In ducks none of the deficiencies influenced the course of the infection to a marked degree. The duck is probably too susceptible to this infection to be a satisfactory experimental animal."

DEARBORN, E. H. Filtrable Agents Lethal for Ducks. *Proc. Soc. Exper. Biol. & Med.* 1946, Oct., v. 63, No. 1, 48-9.

"Filtrable agents, lethal for ducks, were obtained by Seitz filtration of plasma from ducks with lophurae, cathemerium, relictum or elongatum malaria. Attempts to free the malaria of the filtrable agent were unsuccessful."

DEARBORN, E. H. & MARSHALL, E. K., Jr. Curative Action of Drugs in Lophurae Malaria of the Duck. *Proc. Soc. Exper. Biol. & Med.* 1946, Oct., v. 63, No. 1, 46-8.

"A number of drugs have been examined for their curative action in lophurae malaria in the duck. Pamaquine appears to cure a fair percentage of the birds, while quinine, quinacrine, chloroquine and a number of other drugs do not."

TRYPANOSOMIASIS.

FULTON, J. D. & LOURIE, E. M. The Immunity of Mice cured of Trypanosome Infections. *Ann. Trop. Med. & Parasit.* 1946, Apr., v. 40, No. 1, 1-9. [25 refs.]

EHRlich and SHIGA (1904) first demonstrated the fact that mice cured of trypanosome infections were immune to reinfection with the homologous strain. Since that time many studies have been made, chiefly with strains of *T. brucei* and *T. rhodesiense* against infections with which curative drugs have long been known. The recent discovery of compounds with curative action in infections due to *T. congolense*—certain phenanthridinium derivatives and diamidines—have made it possible to carry out similar studies with this trypanosome. Such studies have been carried out by the authors of the paper under review. At the same time they have re-investigated immunity phenomena in mice cured of other infections (*T. rhodesiense* parent strain, atoxyl-fast strain,

in the River 205 fast strain, *T. equinum*, *T. equiperdum*). All these strains were appearing in the

three strains of *T. rhodesiense* and in only four instances Complete failure to become

noted immunity of such immunity breaks down during the passages which occurred tests, or the trypanosomes inoculated at quiring an anti serum-fast character In this conception of the immunity its persistence or not is related to the of the trypanosomes rather than to the ning immunity In support of this view (909) that use of the for the

ment between the immunity made and are

ROMANA, C, GIL, J & DE ROMANA, M S Indices de infección de niños por *S. cruzi* en escuelas de Tucumán, Santiago del Estero y Catamarca [Incidence of Infection by *T. cruzi* in School-Children in Tucumán, Santiago del Estero and Catamarca.] *An Inst Med Regional* Tucumán, Argentine 1946 Aug, v 1 No 3, 317-32, 9 figs & 1 map English summary

Xenodiagnostic and complement fixation tests were carried out on a number of children of the schools of the places mentioned For xenodiagnosis the authors used nymphs of *T. infestans*, *T. rubromaria*, *T. sordida*, *T. platensis* and *Panstrongylus megistus*

In two schools in Trancas (Tucuman) 48 children were examined, 28 boys and 20 girls, between 5 and 15 years of age Twelve were positive to xenodiagnosis, the sera of 10 were tested for complement fixation and 8 were positive (3 or 4 plus) Next month, 30 children at Tapso, on the border between

Catamarca and Santiago del Estero, and 20 in a school at Achalco, 5 kilometres distant, in Catamarca Province were tested. Xenodiagnosis proved positive in 5 of the former and 3 of the latter, or in 8 of the 50. By complement fixation the proportion of positive results was much higher, being 24 out of the 50. One child, a girl of 11 years, had frequent extrasystoles, she had proved negative to the xenodiagnostic test but gave a 3 plus to complement fixation. Among 25 children examined at Rio Hondo, Santiago del Estero, 9 were xenodiagnostically positive and all gave positive complement fixation reactions, as did also one who had been negative to xenodiagnosis. Lastly, 23 school-children in the town of Catamarca were examined by xenodiagnosis and 5 were positive.

Altogether, therefore, 146 were tested by xenodiagnosis and 34, or 23.3 per cent., were positive. Of 82 sera tested for c.f., 42 (51 per cent.) gave 3 or 4 plus. [None of the figures given in the authors' summary are correct, according to the text numbers.]

ROMAÑA, C. & GIL, J. Reacción de fijación de complemento con antígeno de cultura de *S. cruzi* en 500 sueros humanos. [Complement Fixation in Chagas's Disease, with a Culture of *T. cruzi* as Antigen.] *An. Inst. Med. Regional*. Tucumán, Argentine. 1946, Aug., v. 1, No. 3, 297-304. English summary.

Various antigens obtained from cultures of the trypanosomes have been used for this reaction from time to time; in 1936 Kelsner's, in 1942 the Romaña-Dias alcoholic antigen, in 1943 Davies's water culture and, lastly, the purest of all, the polysaccharide antigen of Muniz and Freitas. The present author used the Romaña-Dias antigen for 200 sera; the results were fairly satisfactory, but a large amount of culture was required.

For the study recorded in this paper the culture was obtained from a strain from *T. rubrovaria* which had proved very active in infecting laboratory animals. The culture medium was composed of: Meat extract 5 gm., NaCl 5 gm., agar 12 gm., water 1,000 cc., adjusted to pH 7.4-7.6. After sterilization and cooling to 55°C., defibrinated sheep's blood is added to 10 per cent., and on solidification the surface is covered with glucose broth. On this a rich culture was obtained in 10-15 days. For preparing the antigen the liquid part of the medium is withdrawn, centrifuged and washed three times with physiological saline; the deposit is separated and to it is added 10 times its volume of saline with phenol to 0.5 per cent., mixed with powdered glass, the whole being vigorously shaken to break up the trypanosomes. The suspension, decanted from the powdered glass, forms the stock which is put up in ampoules and diluted for use in the test. This antigen retained its potency unchanged for 7 months, but began to lose it after that time. Later, the author used merthiolate, 1:10,000 physiological saline, as a preservative. The results of the test with 500 sera may be summarized as follows. Of 15 in whose blood *T. cruzi* was seen, 14 gave a positive (4 or 3 plus) and one a negative (1 or 2 plus was regarded as negative); the negative was from a child in a very early stage, about the fourth day, of disease. Chagas himself used to say that a positive ought not to be expected for a month. Of 63 positive by xenodiagnosis 61 were positive by the c.f. test. This occasional negative in patients xenodiagnostically positive has been noted before; it may be due to transient diminution of antibody in the blood, for the same case examined on another day may be positive. Among 341 suspicious cases—suspected on account of cardiac or nervous signs or symptoms—149 were positive, 192 were negative; of 31 syphilitic sera 12 were positive to Chagas's antigen test. All gave a positive Wassermann, but in 12 the Chagas's c.f. test remained positive after the syphilis had been treated and the W.R. had become

suffering from brucellosis, two were negative, one positive, but the last came from a district heavily infested with Triatomidae. Thirty-two cases were from normal subjects or those suffering from disease other than Chagas's disease and all were negative.

The test is therefore of much value. In the authors' words — "The specificity of the reaction is verified. The reactions are positive only in cases of Chagas's disease or [weakly] in cutaneous leishmaniasis." [A paper of much interest.]
H. Harold Scott

LEWIS, Mary N. Exudative Trypanosome Pleuritis of Mice Infected experimentally with *Trypanosoma cruzi*. *Proc Soc Exper Biol & Med* 1946, Oct., v. 63, No. 1, 30-31, 1 fig.

"In the course of the infection of young mice with *T. cruzi* the incidence of pleuritis was observed in 3.6 to 30 per cent of the cases depending on the size of the inoculum. The serous exudate which was sterile if examined with bacteriological methods contained numerous trypanosome forms and intracellular leishmania like bodies."

KLYUEVA N. G. & ROSKIN G. Caneerolytic Substance of *Schizotrypanum cruzi*. *Amer Rev Societ Med* 1946 Dec., v. 4, No. 2, 127-9.

FINDLAY, G. M., HARDWICKE, J. & PHELPS, A. J. Tsetse Fly Repellents. *Trans Roy Soc Trop Med & Hyg* 1946 Dec., v. 40, No. 3, 341-4.

"Under field conditions nine compounds were tested for repellent action against tsetse. Indalone, Formula 622, *N*- α -amylsuccinimide, 2-phenyl-cyclohexanol and *n*-butyl-*dl* malate possessed some activity."

LEISHMANIASIS

HENTZ, H. & NOEL, G. Le premier cas de kala-azar en Belgique. [The First Case of Kala Azar in Belgium]. *Rev. Belge Sci. Méd.* 1942 Dec., v. 14, No. 10, 403-7. [13 refs.]

ADLER, S. & TCHERNOMORETZ, I. Failure to cure Natural Canine Visceral Leishmaniasis. *Ann Trop Med & Parasit* 1946 Dec., v. 40, Nos. 3/4, 320-24. 3 figs. on 1 pl.

In the laboratory we have failed to cure dogs naturally infected with *L. infantum* by treatment with 4'-4'-diamidino stilbene.

In the field we have observed failure to cure infected animals by intensive treatment with neostibosan.

After intensive treatment there is a residual infection in the corneo-sclerotic

FEVERS OF THE TYPHUS GROUP.

BENDICH, A. & CHARGAFF, E. The Isolation and Characterization of Two Antigenic Fractions of *Proteus* OX-19. *J. Biol. Chem.* 1946, Nov, v. 166, No. 1, 283-312. [65 refs.]

The properties of antigenic fractions isolated from *Proteus* OX19, the organism agglutinated by sera of patients suffering from louse-borne typhus (Weil-Felix reaction), have been examined. The extraction of the organisms with trichloroacetic acid or, less effectively, their digestion with crystalline

specificity of C-2 is lost when the fraction is heated or freed from lipins.

Both antigens are complexes consisting of: (a) lipins (with a high proportion of free fatty acids); (b) a protein (containing arginine, lysine, glutamic acid, leucine, isoleucine, proline, and phenyl alanine, but not histidine, tyrosine or tryptophan), (c) a polysaccharide (containing N-acetylglucosamine, mannose, galactose, and perhaps glucose). Part of the organically bound phosphorus is present in the form of an extremely acid-labile linkage. *J. H. Birkinshaw.*

MALCOMSON, M. Elizabeth & WISHART, F. O. Studies of the Serology of Typhus Fever. *Canadian J. Pub. Health.* 1946, Oct., v. 37, No. 10, 411-21. [11 refs.]

The authors describe the results obtained in a study of the complement-fixation responses observed in guineapigs and human beings after vaccination and infection with murine- and epidemic-typhus rickettsiae.

When type-specific antigen the homologous antigen at heterologous antigen, but not considered suitable for testing the potency of vaccines.

Among 81 persons immunized by a combined epidemic and murine vaccine (two parts epidemic to one part murine) nearly all gave a higher-titre response against epidemic than against murine antigen. Five months later the titres had fallen greatly, sometimes almost to zero, but after a recall dose of vaccine they rose to a greater height, and were more persistent, than they had been after primary vaccination.

Sera of 50 typhus patients treated in the Middle East were received from Major van Rooyen; when these were tested against soluble antigens, high titres (1-800 or over) were observed in most of the cases; but in 21 the epidemic and murine titres were the same, and in 25 there was only a two-fold difference in the titre, so that differentiation between the two types of the disease was rarely possible.

When a common (heat-stable) antigen was used comparable results were obtained; but with a type-specific antigen differentiation of the type was usually possible, in 60 per cent. the epidemic titre was at least four times higher than the murine, in 8 per cent. it was twice as high, and in the remaining cases the sera were anticomplementary or otherwise unsatisfactory, probably owing to prolonged storage.

In 22 cases of suspicious illness among laboratory workers who had been protected by a bivalent vaccine the disease was shown to be typhus by the occurrence of a rising-titre complement-fixation reaction. Using type-specific antigens 14 of the cases could be classed as epidemic on the strength of an

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The authors conclude that when common and type-specific antigens are used the complement fixation reaction is the test of choice in cases in which tests involving the use of infective rickettsiae cannot be carried out

[The question of the reliability of the complement fixation test as a method of differentiating between epidemic and murine typhus seems to be still *sub judice*]

John W. D. Megaw

MALCOMSON M Elizabeth & WISHART F O Studies of the Serology of Typhus Fever *Canadian J Pub Health* 1946 Nov 37 No 11 461-6 [18 refs]

The chief conclusions stated in this paper are —(1) The Weil Felix test is of little value as a method of testing antibody response to vaccination against typhus. The reaction is positive in 50-75 per cent of vaccinated persons and rarely at a high titre. (2) Equally poor results are obtained by complement fixation tests in which the heat stable antigen common to that of *Proteus OX19* is employed. (3) In typhus fever among vaccinated persons there is no significant rising titre response to the Weil Felix test. (4) When *Pr OX19* antigens are used in complement fixation tests the results are comparable with those obtained with the Weil Felix tests in vaccinated persons and also in typhus patients who had not been vaccinated. (5) The Weil Felix reaction becomes positive earlier than any other serological test for typhus fever but it suffers from the drawback of incomplete specificity whereas the rickettsial complement

the killed suspensions

Details of the experiments on which these conclusions are based will be found in the paper

John W. D. Megaw

GILLIAM A G Efficacy of Cox-Type Vaccine in the Prevention of naturally acquired Louse-borne Typhus Fever *Amer J Hyg* 1946 Nov 34 No 3 401-10

The author gives a detailed account of a critical study of the efficacy of an ether-extracted yolk sac vaccine manufactured in 1942 and administered to 743 employees of the Cairo Fever Hospital between February and June 1943. 136 other employees received no vaccine. Among the vaccinated persons 111 received only one dose, 138 received two doses, and 494 received the full course of three doses. Persons who were attacked by typhus fever less than four weeks after receiving the vaccine were regarded as not having been effectively immunized.

Altogether 48 attacks occurred and when allowance was made for the various disturbing factors it was estimated that one or two doses of the vaccine were somewhat effective in ameliorating the clinical course of the attacks but had little effect in protecting against the occurrence of attacks whereas the full course of three doses reduced the attack rate to a degree which was of borderline statistical significance.

The results were as shown in the table :—

Effective vaccinal state . . .	No vaccine	One dose	Two doses	Three doses
Number of attacks . . .	23	6	10	4
Attack rate per 10,000 person weeks . . .	27.8	35.8	72.9	16.4

The author mentions that later work has resulted in the preparation of a more potent vaccine, which is now given as two primary doses followed later by "booster" doses at intervals.

[The paper is a model of careful observation and of scientific caution in the interpretation of the findings.]

FAJERSTEIN, S. G. & BESDENJESZNICH, K. V. [The Efficacy of Vaccination and Revaccination against Typhus.] *Hygiène et Service Sanitaire*. Moscow. 1946, No. 6, 43-8. [In Russian.]

During the years 1942-1944 anti-typhus vaccinations were carried out amongst the staff of 12 Moscow railway stations. Persons vaccinated were those considered to be exposed to infection by virtue of close contact with passengers and included station workers, station police and NKVD, train crews, and medical staff. Three injections of 0.5-1 c.c. were given, with intervals of 5 to 12 days, the vaccine of Duren, Krontovskaya and Maevsky was used. A total of 16,797 persons received one course of vaccination, and 6,497 were revaccinated, in successive years. A group of 17,735 was left unvaccinated for control purposes. Local reactions were seen in 5.1 per cent. and general reaction in 7.7 per cent.

Over a one-year period of observation, the morbidity amongst vaccinated subjects was 13.7 per 10,000, and amongst controls 27 per 10,000. The incidence was 6.5 (controls 22.6) after the complete course was . . .

COWPER, S. G. . . . Disinfestation Plant used in a Typhus Hospital for Prisoners of War in Germany. *J. Roy. Army Med. Corps* . . . v. 87, No. 4, 173-6, 1 fig.

In this paper . . . description of hospitals of pri station was ob

Among 1,904 . . . found infested with lice; this result is not surprising in view of the elaborate process of disinfestation to which each patient was subjected before admission to the ward. The protection of members of the staff employed at the station was equally thorough.

The station had nine separate rooms, apart from passages and a detached laundry. The building and equipment were specially planned and constructed, regardless of cost, for the disinfestation and disinfection of the skin and clothing of the patients. Obviously the threat of a widespread epidemic of typhus in Germany was taken very seriously.

Now that DDT and other effective disinfestants are available it is unlikely that the construction of costly static stations of the kind will be contemplated

John D W Megaw

MELENEY, H L & FRENCH R S Endemic Typhus Fever in Southern California Reprinted from *California & Western Med* 1945, Mar, v 62, No 3 14 pp 1 chart [14 refs]

This paper deals with the reported occurrence of typhus fever of the

Sa
The disease was predominantly urban 125 of the cases being from Los Angeles City and 17 from San Diego City

The months of chief prevalence in descending order were --October (43 cases), November (31 cases) December (24 cases) September (21 cases), May (19 cases) July (18 cases) and August (17 cases) In the remaining months the number of cases ranged from 6 to 10

In 1925 the disease suddenly ceased to occur in Los Angeles City presumably because of a campaign of rat control carried out to check an epidemic of pneumonic plague

Only 0.5 per cent of the cases occurred among children of the 0-9 age group, 73 per cent of the patients were males Only one case was diagnosed by guinea pig inoculation There were 7 deaths (3.2 per cent) and only one of these occurred among persons under 40 years of age

The authors think that the disease may be extending further northwards, and also may be increasing in rural areas

John D W Megaw

LEWTHWAITE, R O CONNOR J L & WILLIAMS S E The Tsutsugamushi Disease: Attempted Preparation of a Prophylactic Vaccine from Fertile Hens' Eggs experimentally infected with the Virus *Med J Australia* 1946 July 13 v 2 No 2 37-43 3 figs [10 refs]

The investigation described in this paper was carried out in 1942 and 1943 it was reported confidentially in the same years but publication was delayed for security reasons The findings are therefore largely of historical interest, though some of them can still be studied with profit by workers on the rickettsia

fixed by methyl alcohol stained with Jenner Giemsa stain and differentiated

ponding suspensions of *R. prowazeki* After successive yolk sac passages the virulence to mice of a strain was found to have become greatly reduced though the survival period of inoculated chick embryos remained the same—usually 7-9 days

Various attempts to obtain richer growths and more concentrated suspensions of the organism were unsuccessful; so also were attempts to immunize mice and guineapigs by a yolk-sac vaccine.

The authors failed to prepare from yolk-sac suspensions antigens suitable for complement-fixation and rickettsia-agglutination tests.

John W. D. Megaw.

HUEBNER, R. J., STAMPS, Peggy & ARMSTRONG, C. Rickettsialpox—a newly recognized Rickettsial Disease. I. Isolation of the Etiological Agent. *Pub. Health Rep.* Wash. 1946, Nov. 8, v. 61, No. 45, 1605-14.

The authors report the isolation of a specific rickettsia from a patient suffering from a new disease for which they propose the name rickettsialpox. The disease is said to be the same as the one described by SUSSMAN in an article (*New York Medicine*, 1946, v. 2, 27) dated August 1946, under the title "Kew Gardens Spotted Fever." [The Kew Gardens referred to is presumably in New York.] In October 1946, SHANKMAN reported an outbreak of a similar fever, described as an "Endemic Febrile Illness not yet identified, occurring in New York City" (*New York State J. Med.*, 1946, v. 46, 2156).

The present report is based on a study of an outbreak in which 80 cases occurred during a period of 10 weeks "in a housing development in New York." The only reference to the clinical features of the disease is in the statement that it resembles chickenpox.

In the course of animal-inoculation experiments carried out on 15 patients, a rickettsial organism was isolated from a mouse inoculated intraperitoneally with blood taken from a patient on the 2nd day of his illness. The spleen of the mouse was found enlarged to 8-10 times the normal size, the liver was large and oedematous, and there was a blood-tinged peritoneal exudate. Four serial passages were made through mice, guineapigs, and yolk sacs of embryo chicks. Numerous rickettsia-like organisms were found in yolk-sac smears.

Antigens prepared in three different ways from yolk-sac cultures were used in a large number of complement-fixation tests, in which sera of patients reacted at titres ranging from 1-16 to 1-640, nearly all the sera of Rocky Mountain spotted fever patients also reacted, at somewhat lower titres ranging from 1-8 to 1-512. Sera of healthy persons and of patients suffering from endemic typhus, Q fever and syphilis, gave negative reactions.

Sera of 19 rickettsialpox patients were tested against Rocky Mountain spotted fever antigens; 15 gave positive reactions at titres ranging from 1-4 to 1-320.

Weil-Felix tests (*Proteus* OX19) of an unstated number of rickettsialpox sera yielded only two positive reactions, at titres of 1-100 and 1-200 respectively. Agglutination tests for tularaemia, brucellosis, leptospirosis, and typhoid-group fevers were uniformly negative.

In guineapigs the organisms were readily maintained by intraperitoneal inoculation with tunica scrapings, there was a pronounced scrotal reaction.

Preliminary tests indicated a partial degree of cross immunity with the rickettsia of Rocky Mountain spotted fever.

John W. D. Megaw.

HUEBNER, R. J., JELLISON, W. L. & POMERANTZ, C. Rickettsialpox—a newly recognized Rickettsial Disease. IV. Isolation of a Rickettsia apparently identical with the Causative Agent of Rickettsialpox from *Allodermanyssus sanguineus*, a Rodent Mite. *Pub. Health Rep.* Wash. 1946, Nov. 22, v. 61, No. 47, 1677-82.

Two strains of a rickettsia, for which the name *Rickettsia akari* is proposed, have been isolated from pools of mites (*Allodermanyssus sanguineus*) collected

in the development area referred to in the preceding abstract. Some of the mites were collected from house mice (*Mus musculus*); large numbers were found on the outer surface of walls of incinerators.

One of the authors (W. L. J.) was attacked by rickettsialpox three weeks after collecting and processing mites; he was not aware of having been bitten until he observed an initial lesion seven days before the onset of the fever.

Mites that were not already engorged were allowed to feed on guineapigs or very young mice. Four days later the mites were divided into pools from which suspensions were made and injected intraperitoneally into Swiss mice and male guineapigs. Both strains were found identical in all respects with the strain described in the preceding abstract.

One of the strains was isolated from the brain of a four-day-old mouse on which mites had been fed 10 days previously.

Four additional strains were isolated from pools of mites, but attempts at yolk sac cultivation were unsuccessful. Two of these strains were from pools of mites already engorged with blood and therefore not allowed to feed again till they were used to inoculate guineapigs.

The only sign of disease observed among the guineapigs used for feeding mites was a vesiculo-papular lesion on one animal at the site where a mite had fed eight days earlier.

John W. D. Megaw

ANGSTEIN, L. & WHITNEY, Dorothy M. Anti-Rickettsial Activity of Para-Amino-Benzoic Acid (PABA). Evaluation and Significance of PABA Blood Levels in Guinea Pigs with reference to Spotted Fever Treatment. *Texas Reports on Biol. & Med.* 1946, 4, No. 3, 338-52, 2 figs. [11 refs.]

ANGSTEIN and BADER have already shown that 80 per cent. of guineapigs inoculated with a lethal dose of rickettsiae of Rocky Mountain spotted fever recover when para-aminobenzoic acid (PABA) is added to their diet to the extent of 2 per cent. from the time of inoculation. See this *Bulletin* 1945, 1, 42-55.]

The present paper contains an account of the results obtained from the administration of PABA in various ways. Parenteral injections of the sodium salt were found unsatisfactory, although high blood-concentration levels of the drug were observed for brief periods after each injection.

Administration 1

drug with the food

(1) Normal diet

weight) together with 5 gm. vitamin free casein daily failed to save any of six guineapigs, though only one of them became typically ill.

(2) When the casein was replaced by 2 per cent. calcium gluconate the recoveries were 50 per cent.

(3) When the daily diet contained 2 gm. PABA, 2 gm. calcium gluconate, and 10 gm. soya bean flour there was only one death among six treated guineapigs.

The soya bean and casein were given to counteract a fall in the plasma

it is disconcerting to be told that in healthy and infected guineapigs not treated by any drug an unknown substance giving the same colour reaction as PABA

occurs in the blood, soon after a meal, but not in the fasting animals. The presence of this substance in normal conditions "deserves attention in evaluating PABA levels."

The action of PABA is believed by the authors to be "indirect, through a complex mechanism in which the enzyme system of the host and the metabolic requirements of the parasite are involved."

John W. D. Megaw.

FLINN, L. B., HOWARD, J. W., TODD, C. W. & SCOTT, E. G. Para-Aminobenzoic Acid Treatment of Rocky Mountain Spotted Fever. *J. Amer. Med. Ass.* 1946, Dec. 14, v. 132, No. 15, 911-15, 5 charts. [Refs. in footnotes.]

The authors describe the results obtained by the use of para-aminobenzoic acid (PABA) in the treatment of 10 cases of Rocky Mountain spotted fever in Wilmington, Delaware, in 1946. The controls available were 21 patients seen in the same area during the period 1938-1946.

Among the treated patients there was only one death, which occurred in a man aged 67 years who was admitted on the 8th day of the illness and who was found at autopsy to have suffered from long-standing renal and myocardial disease. Among the control patients there were five deaths, at the ages of 3, 33, 48, 52 and 63 years.

Dealing only with the 9 treated patients aged less than 40 years, all of whom survived, and the 13 surviving control patients of the under-40 age group, it appears that the average number of days of fever among the former was 10.5, and among the latter 17.5. The temperature of the treated patients dropped rapidly to normal within two to four days of the commencement of treatment, and a decided clinical improvement was observed even earlier.

Composite curves showing the average course of the fever in the above two groups suggest that there was a striking response to treatment.

PABA is rapidly excreted in the urine so that frequent administration is needed to maintain a satisfactory level of blood concentration of the drug; the method found most satisfactory was to give four to six 0.5 gm. tablets every two hours. The total dosage ranged from 50.4 to 327 gm.

The urinary output was found to have an important influence on the blood level of the drug; in one patient the level was 46-48 mgm. per 100 cc. with a daily dosage of 12 gm. and a daily urinary output of 250-500 cc., but when the urine output rose to about 1,500 cc. the level fell below 10 mgm. even with a higher dosage of 20 gm.

The diagnosis was regarded as being certain in every case; it was based on: tick bite or exposure to risk of bite in an affected area; a rising titre agglutination of *Proteus OX19*, and a typical rash, first on the wrists and ankles, then on the palms and soles, and later extending to the trunk.

The results appear to have been surprisingly good, considering that the treatment was started on the average 7.6 days after the onset of the fever.

The maximum PABA blood levels observed during the investigation ranged from 6.5 to 48 mgm. per 100 cc. in the patients who recovered; the optimum level, as suggested by the authors, is 30-60 mgm. The method of estimating the blood level was that described by ECKERT [*J. Biol. Chem.*, 1943, v. 148, 197].

John W. D. Megaw.

GALLI, G. W. A. Solution as Serum Diluent in *Proc. Soc. Exper. Biol. & Med.*

"The use of a 5.0 per cent. solution of sodium chloride as a serum diluent in agglutination tests with *Rickettsia burneti* reduced or eliminated the prozone effect and permitted the employment of a more dilute antigen."

VAN DEN ENDE M STUART HARRIS C H FULTON, F & NIVEN J S F
Chemotherapeutic and other Studies of Typhus

This book is reviewed on p 472

YELLOW FEVER

TAYLOR R M DA CUNHA J F LAEMMERT H W JR FERREIRA L de C
An Epidemiological Study of Jungle Yellow Fever in an Endemic Area in
Brazil Part I Epidemiology of Human Infections [TAYLOR & DA CUNHA]
Part II Investigations of Vertebrate Hosts and Arthropod Vectors
[LAEMMERT FERREIRA & TAYLOR] *Suppl to Amer J Trop Med* 1946
Nov 1 26 No 6 69 pp 3 maps & 3 figs [79 refs]

The first part of this important monograph deals with the epidemiology of the disease based on studies made in the vicinity of Ilhéus—a town on the

beached in 1931 and the first positive liver in 1934 came from a three year old child who had lived in a densely wooded locality in the district of Japu Ilhéus. This was the first proved case of jungle yellow fever in this region. Four out of the seven remaining members of this family were found to be immune against yellow fever one a boy seven years old. Subsequently other positive liver specimens were obtained in 1935 1936 1940 1941 1942 and 1943 in widely separated rural areas and out of a total of 311 blood specimens from persons in the neighbourhood 37.3 per cent gave positive protection tests against yellow fever.

The climate and general features of this region are described in detail and then the scope of the study which included not only the direct method of trying to isolate the virus and to trace its passage in man and animals but also the indirect method of determining the habits and environment favouring human infections and the flora and fauna conducive to the maintenance of virus in the forest.

An immunity survey of the human population was undertaken by means of neutralization tests as recommended by THEILER [this *Bulletin* 1933 1 30 714] the complement fixation test was also done.

The percentage of positives was found to be greater in the southern districts of Ilhéus where it exceeded 30 per cent. These districts contain or border upon the more extensive forests. The relation of occupation to yellow fever immunity in a group of 707 persons shows that the highest percentage of immunes (40.7) occurred among the labourers on cacao plantations workers on mandioca farms showing 19.5 and children (of no occupation) 11.6 per cent respectively. The relation of visits to old type forests aged 75 years or more to yellow fever immunity is then given in tabular form and the results indicate a correlation between the percentage of immunes and the frequency of visits to such forests.

Thus out of 77 persons making daily visits 58.4 per cent were positive as compared with only 11.9 per cent in those never visiting the forests. Visits to young type forests (under 75 years of age) did not seem to enhance the chance of acquiring immunity. In all these groups males showed a considerably higher percentage of immunes than females. The immunity rate was also found to be significantly higher in those living in the vicinity of old type forests.

Fifteen months after the first survey was made, blood specimens of 234 persons who had given negative results were re-examined. Only one, an adult male, was positive on this second survey.

The general results confirm earlier observations that contact with forest is the salient feature associated with infection, and that it is an occupational disease only in so far as the occupation leads to forest contact.

The second part, dealing with the studies on mammals, birds and arthropods, opens with a review of previous work on the subject, followed by a description of the field and laboratory methods employed in the authors' investigations.

A total of 5,322 mammals was collected including Rodentia 2,300, Primates 1,851, Marsupialia 1,040, Chiroptera 81, Carnivora 28, Edentata 21, and one Artiodactyle. These are classified according to order, genus and species, and the type of vegetation where they were captured. The two principal breeding seasons were found to be January to May and August to November; no pregnant females and few young were caught in June, July and December.

Neutralization tests were carried out on a large number of the mammals and a high percentage of sera from certain species of rodents, especially *Oryzomys* spp., neutralized yellow fever virus, but it is believed that this neutralization was the result of some non-specific virucidal substance in the blood rather than to specific immunity to yellow fever virus. Sera from a total of 1,756 mammals and 141 birds were inoculated into non-immune marmosets, many of the sera being pooled before inoculation. All the results were uniformly negative, with the exception of blood from marmosets. On four separate occasions yellow fever virus was isolated from wild *Callithrix penicillata*, during what seemed to be a transient epizootic among these animals. At the same time, and in the same locality, the virus was also obtained from the mosquito *Haemagogus spegazzinii*.

Except for this, a total of 172,873 mosquitoes and also various ectoparasites from rodents and marsupials were tested for virus with negative results.

The highest percentage of immunes was found among marmosets captured in the old-type forests, and in these regions *Haemagogus* mosquitoes were four times more numerous than in other types of forest. There is thus an association of immunity both in humans and marmosets and the prevalence of *Haemagogus* with the older climax type of tropical rain forest.

Although *Metachirus nudicaudatus* and at least one species of *Marmosa* (*M. cinerea*) were susceptible to infection with the yellow fever strain isolated from the marmosets, neutralization tests on the sera of captured marsupials did not suggest that they were involved in the cyclic passage of the strain in nature.

The maintenance of the virus in the region studied may be explained by the Primate-mosquito cycle, involving marmosets and *Haemagogus*. E. Hindle.

BATES, M. & ROCA-GARCIA, M. The Development of the Virus of Yellow Fever in *Haemagogus* Mosquitoes. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 585-605, 3 figs. [15 refs]

The authors have recently described the establishment of laboratory cycles of yellow fever virus using *haemagogus* mosquitoes and Saimiri and douroucoul monkeys caught in the Villavicencio region of Colombia [this *Bulletin*, 1946, v. 43, 32]. They have been studying in detail the principal factors governing mosquito infection with virus and the present paper deals with the effect of variation of the dose of ingested virus and the environmental temperature.

[April 1947]

Quantitative estimations of virus have been made by subcutaneous inoculation of 3-day-old mice as this method gave results almost identical with that of intracerebral inoculation of 7 day-old mice and produced fewer deaths from contamination or toxic material in the inoculum. Bates and Roeca have found that 7-day-old mice on intracerebral inoculation are just as susceptible to the local strain of virus as are Samuri monkeys on intramuscular inoculation and that the minimum lethal dose for 7 day-old mice corresponds very closely to the minimum infectious dose for Samuri monkeys.

When testing for the presence of virus in mosquitoes suspensions of individual insects were inoculated into mice instead of using pooled mosquitoes because of the variation in virus content of individual mosquitoes. The rate and degree of virus multiplication in the mosquitoes after having a meal on an infected monkey were dependent upon the temperature at which the mosquitoes were kept and also upon the amount of virus apparently dies out slowly in mosquitoes kept at a large dose is ingested virus apparently dies out slowly in mosquitoes kept at 20°C reaching a minimum concentration on about the fifth day. It apparently persists at this minimum level indefinitely. If the amount of virus ingested is small the virus might drop below the threshold detectable with mice or even die out during the first five days without becoming established in the mosquito at all. When the environmental temperature was 25°C the virus apparently reached its minimum level on the fourth day. At 30°C the period of virus loss apparently lasts for two days. When the mosquitoes were kept to those obtained with a constant temperature of 30°C the results were very similar for 20 hours daily at 25°C and 4 hours at 30°C but there is great variation in time taken to reach periods of virus loss multiplication takes place slowly at 25°C and 30°C and apparently necessary for transmission. At 30°C there is sufficient virus after 10 days of virus loss apparently depends on the events of the period of virus loss or transmission of infection to monkey by bite at $25-30^{\circ}\text{C}$ after 12 days at 30°C after 23 days at 25°C after 28 days. Whether the mosquito becomes infected or not apparently depends on the penetration of the virus into the mosquito tissue before it dies or has been eliminated. It is probably a question of whether the virus can penetrate the gut wall and get established in the rest since the temperature conditions in the forest canopy where haemagogus are found most abundantly are subject to wide diurnal fluctuations. The marked accelerating effect of 4 hours at 30°C is extremely important for the results of the $25-30^{\circ}\text{C}$ temperature alteration are certainly much more likely to approximate natural conditions than results with a constant temperature of 30°C . The $25-30^{\circ}\text{C}$ temperature is also very favourable to the physiological processes of mosquitoes themselves for there is greater longevity and the percentage of females laying eggs and the number of eggs laid per female are greater than at 30°C .

When mosquitoes were fed on infected Samuri or Aotus the percentage of mosquitoes showing virus depended directly upon the amount of virus in inoculation in the host animal at the time of feeding provided that the virus strain and environmental temperature were constant. With increasing doses of incubation gradually decreases from 18 days to a probable minimum of 10 days. It also seems probable that some individual haemagogus are more susceptible to infection than others also that there is considerable individual variation in the time required for a mosquito to become infective. Experiments showed that it would be very difficult if not impossible to establish cyclic transmissions with haemagogus mosquitoes using a strain of virus that had been passed several times through mouse brain.

PELTIER, M. Preparation of the Yellow Fever Vaccine produced by the Pasteur Institute, Dakar. [Extract.] *Epidemiological Information Bull.* (UNRRA Health Division). Washington, D.C. 1946, Oct. 15, v. 2, No. 19, 806-8.

As a result of a recent test of the immunity produced by the injection of the yellow fever vaccine prepared by the Pasteur Institute, Dakar, this vaccine has been accepted by UNRRA as a satisfactory vaccine [see this *Bulletin*, 1946, v. 43, 1135].

The vaccine is made from the brains of mice inoculated with the French strain of virus which has been carried to the 256-258th passage in mouse brain. Mice are inoculated intracerebrally with virus, and only those mice that show definite paralysis on the fourth or fifth day after inoculation are used.

The brains are removed, pieces taken for aerobic and anaerobic culture, and the remainder stored in glass tubes at -25°C . till a number of brains have been collected. The brains are then transferred to a vacuum chamber containing calcium chloride and returned to the -25°C . refrigerator. The brains are then dehydrated under vacuum for three to four days. Perfect desiccation is said to take place. The sterile dried brains are removed and finely ground in a mortar with infusorial earth to which powdered kaolin is added. To one measured volume of brain powder two volumes of sterile inert powder are added. The mixture is again dehydrated under vacuum at -25°C . for 24 hours and a second sterility test made.

The sterile powder is then distributed into ampoules each containing 1/10 of a brain which represents 100 doses of vaccine. The vaccine titre is taken as the amount which will kill a mouse with regularity at a dilution corresponding to one part fresh virus in 1,000,000 parts. The ampoules are sealed under vacuum and stored at -4°C . The vaccine retains its potency for two months after leaving the laboratory, provided it is kept in an ice-box. The vaccine may be transported at ordinary temperatures if for not more than a few days.

For use, the powder is placed in a mortar and 2 cc. of a sterile neutral gum solution is added drop by drop and mixed with the powder. The yellow fever vaccine is frequently mixed with dried anti-smallpox vaccine virus and injected at the same time. Two drops of the suspension are deposited with a vaccine style on the skin of the deltoid region. Through each drop, two parallel scarifications of 0.5 cm. in length are made. The gum dries and provides a covering.

It is said that the method of scarification is better accepted by the African populations than is subcutaneous injection. [The respective merits of this vaccine and the 17D chick embryo vaccine have been discussed previously, see this *Bulletin*, 1947, v. 44, 73.]

F. O. MacCallum.

PLAGUE.

MAGROU, E. Epidémie de peste bubonique à Ferryville (Tunisie). Traitement par la sulfadiazine. [An Epidemic of Bubonic Plague at Ferryville (Tunisia). Treatment by Sulphadiazine.] *Rev. Méd. Nav. (Métropole et Outre-Mer)*. Paris. 1946, v. 1, No. 2, 105-21, 4 figs.

An epidemic of bubonic plague appeared in Ferryville in August 1944 and ended in March 1945. There were 37 cases, with 10 deaths. All the deaths occurred amongst men except one which was in a child. The cases comprised 24 men, 6 women and 7 children of less than 13 years old. There were 25 cases

amongst Europeans and 12 amongst the native population. Half of the persons affected were workers at the Naval Establishment of the port or members of their families.

Clinically all cases assumed the bubonic form except one which was septicaemic. One patient developed a secondary pulmonary form.

Treatment with sulphadiazine reduced the mortality in 28 patients so treated to two (7.14 per cent). The addition of therapeutic serum did not appear to offer any additional advantage. Prophylactic measures included general vaccination of the local population with Girard's live vaccine. This vaccine was given to nearly 60,000 people.

The anti-rat campaign within the naval area of the port was intensified and should not be relaxed. The hope is expressed that the civil authorities will co-operate in maintaining it.

H. J. O. D. Burke Gaffney

LANDSBOROUGH D & TUNNELL N. Observations on Plague Meningitis. *Brit Med J* 1947 Jan 4 47

Meningitis is not regarded as one of the common lesions in plague. This

spinal fluid of five of these patients and one of them probably the most inter-

c treat
ing the

W. F. Harvey

SOMMER, S. S. & WAGLE, P. M. A Note on the Use of Sulphonamides in the Treatment of Plague in the Field. *Indian Med Gaz* 1946 Sept v 81, No 9 343-6

Much the most important single factor determining death or recovery in plague is the development and degree of septicaemia. In fact if there were only bubo and no septicaemia spontaneous recovery was the rule. It is well therefore in evaluating treatment to concentrate on septicaemic cases. The case mortalities in field trials 1,604 cases of which 1,328 related to sulphathiazole were with treatment antiplague serum sulphapyridine sulpha-

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and could be reduced "if an alkaline mixture containing citrates is given every four hours after each dose of the drug and the patients encouraged to drink plenty of water so as to maintain a urinary output of 1,000 to 1,200 ccm. a day."

W. F. Harvey.

HUANG, C. H. & CHU, L. W. Treatment of Bubonic Plague with Sulfadiazine. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 831-9, 1 fig. [20 refs.]

Sulphathiazole is admittedly efficacious in bubonic plague. The authors, however, as a result of their experience in a small series of 25 cases are inclined to think that sulphadiazine may be even more effective. Of the 25 cases, 16 were treated with sulphadiazine alone, three with sulphadiazine and serum, four at first with sulphadiazine and serum but later with sulphadiazine, and two with sulphathiazole alone. It was apparent in this study that bacteraemia is readily controlled by the sulphonamides, but that viable bacteria remain unaffected within buboes. This, as the authors point out, leaves open the possibility of relapse and, in fact, relapse may have possibly occurred in one case. The argument for superiority of sulphadiazine over sulphathiazole is based on its use in four cases where sulphathiazole had proved unsuitable and where replacement with sulphadiazine was followed promptly by satisfactory response. Moreover, sulphadiazine has fewer toxic reactions than sulphathiazole.

W. F. Harvey.

GRASSET, E. Control of Plague by means of Live Avirulent Plague Vaccine in Southern Africa (1941-44). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1946, Dec., v. 40, No. 3, 275-94. [11 refs.]

Examples of the use of live avirulent plague vaccine as a means of controlling human outbreaks of plague in Southern Africa and Basutoland.

High Veld and South-west Africa and Basutoland." Vigorous measures have been taken to apply vaccino-prophylaxis and to collect data during human plague outbreaks. The vaccine, of K/120 South Africa and E.V. Madagascar strains, was a live suspension in concentration of 1,000 million organisms per cc. given subcutaneously in a dose of 1 cc. by single injection. Experiments in dehydration of the vaccine at low temperatures by means of the lyophile process showed storage capabilities up to two years with "only little attenuation in the antigenic properties." As a method of mass immunization carried out to a total of 40,000 individual doses, the vaccine proved eminently satisfactory inasmuch as the reactions were mild. Fourteen outbreaks of plague have been investigated and out of one total of 24,000 persons immunized, there occurred only seven pneumonic, seven bubonic and one septicaemic case of plague. The last case recovered. Protection from the immunization is claimed to begin to be effective by the fifth day and to be maximum by the tenth day after inoculation.

W. F. Harvey.

WAYSON, N. E., McMAHON, Margaret C. & PRINCE, F. M. An Evaluation of Three Plague Vaccines against Infection in Guinea Pigs induced by Natural and Artificial Methods. *Pub. Health Rep. Wash.* 1946, Oct. 18, v. 61, No. 42, 1511-18.

There is probably no better test organism for evaluation of effective prophylactic vaccine immunization than a *Pasteurella*. Plague, moreover, is a

reading. The numbers of animals used 10 to each test is not large but the results are clear and significant. Three plague vaccines were tested all of them consisting of organisms killed by phenol or formalin which would seem judging by the results to affirm that a dead vaccine still holds the field in immunoprophylaxis. Guinea pigs were the test animals because they are extremely susceptible to plague develop symptoms of plague in much the same way* and convalesce from plague in much the same way as man. The whole series of experiments was not only well controlled but as nearly natural as could be because the final test of immunity was by the bites of proved vector *Xenopsylla cheopis* fleas as distinct from merely proved infected fleas.

Cultures of plague for the preparation of vaccine were grown at 39°C in preference to 37°C or lower temperatures because experience had demonstrated the greater value of these vaccines and because the plague bacillus at 39°C developed a larger immunogenic envelope. Two sets of controls were provided each of equal numbers of animals with the test series these were a non specific inoculation with anti typhoid vaccine and no treatment at all. The evidence of successful transmission of plague on clinical grounds has been determined by several years experience and is a very useful column of results in the tables provided and also a useful addition to the usual argument from mortality alone.

of a red papule and the subsequent enlargement of contiguous lymph nodes with accompanying fever. The evolution of the lesions produced in the immunized animals which recovered was remarkably similar to that which occurs in human cases which recover.

Details of the preparation of the vaccines are carefully given and there does not seem to be much point in adding alum precipitation to simple alcohol

Preparation used	No of animals tested	Clinical Plague	Death with Plague
Alcohol precipitated vaccine	8	8	0
Alcohol alum precipitated vaccine	5	4	0
Commercial vaccine	8	7	3
Typhoid vaccine	8	7	6
Untreated	15	13	11

Fuller details of all the precautions taken to check the results and to ensure the validity of the experiment should be sought in the original communication

H F Harvey

- * KARTMAN L. On the DDT Control of *Synosternus pallidus* Taschenberg (Siphonaptera, Pulleidae) in Dakar, Senegal, French West Africa. *Amer J Trop Med* 1946 Nov v 26 No 6 841-8 2 figs

The author has recently pointed out [this *Bulletin* 1946 v 43 740] that *Synosternus pallidus* may be a plague vector in the Dakar region. The present paper describes tests of DDT treatments as a control measure using a sticky

paper method of trapping fleas to estimate their numbers, as described in the earlier paper. Biting activity before and after treatment were also estimated by use of a human subject.

The DDT was applied as a 5 per cent. kerosene solution, either directly on the floor and lower walls or atomized in the air and allowed to settle, or else as a 10 per cent. talc dust. Controls untreated and sprayed with plain kerosene were kept under observation. The results showed a very great reduction with all DDT treatments which was sustained for at least sixty-four days. There was no great difference between the various methods of application and dosage rates above 100 mgm. per sq. ft. did not secure increased kills. The fleas were

CHOLERA.

STOWMAN, K. The 1946 Cholera Epidemic in China. *Epidemiological Information Bull.* (UNRRA Health Division). Washington, D.C. 1946, Nov. 15, v. 2, No. 21, 877-93, 1 map.

Epidemics of cholera have been an almost constant occurrence in China for the past forty years or more, but the 1946 epidemic was one of the most extensive ever recorded in the Far East. At the same time the loss of life was not so great as the early returns led the authorities to expect. Most of this Bulletin, which is to be discontinued, deals with the distribution of cholera throughout China. The epidemic was first reported in the north-east of China in July, 1946, and spread rapidly to the Yangtze and the Kwangtung epidemic. The former had a low, moderate case mortality rate, which leads to the conclusion that "the Yangtze type is more amenable to treatment than the Kwangtung type." The chief of the epidemiological service takes the opportunity in this report to remark on the strict compliance of China with the rules of notification. "This strict adherence to both letter and spirit of the International Sanitary Conventions entitles the National Health Administration to high esteem."

W. F. Harvey.

VAN LOGHEM, J. J. Le vibron el Tor isolé à la Mecque. [Vibrio El Tor isolated in Mecca.] *Ann. Inst. Pasteur.* 1946, Nov.-Dec., v. 72, Nos. 11/12, 976-7.

GALLUT, J. Sur la détermination du vibron cholérique: production d'acétylméthylcarbinol. [Production of Acetylmethylcarbinol by the Cholera Vibrio.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 239-44, [10 refs.]

Vibrios agglutinable by international standard anti-O serum are the true cholera vibrio and the El Tor vibrio. The further test of haemolytic activity and the Voges-Proskauer reaction serve to separate the two groups, true cholera being Voges-Proskauer negative. Gallut contends that true cholera is not Voges-Proskauer negative, but is capable, in a sensitive medium with suitable testing, of producing acetylmethylcarbinol. This finding, however,

exceeds 100 mgm this is presumptive evidence that the test vibrio is either El Tor or Celebes

W F Harvey

BURROWS, W, MATHER, Adaline N, ELLIOTT, Marian E & WAGNER, Sylvia M
Studies on Immunity to Asiatic Cholera. I. Introduction. *J Infect Dis.* 1946, Sept-Oct, v 79, No 2, 159-67 [23 refs]

In this Introduction to Studies on Immunity to Cholera, the authors assemble a number of data and statistical opinions on the proved, or unproved, value of cholera vaccines. They bring forward, and themselves comment on the fact, that there is little positive evidence available—a tentative conclusion may perhaps be drawn "that immunization produces an immunity of some small degree of effectiveness," but prophylactic inoculation against cholera as practised now and in the past leaves much to be desired. The cholera vibrio in its infection remains within the lumen of the bowel and to all intents and purposes "outside the tissues of the body throughout the disease." Even the symptoms of cholera may possibly be due as much to dehydration and demineralization as to toxæmia. [It might have been worth while advocating evaluation of the prophylactic effects of inoculation by the alternate case method, were it not probable that some form of chemotherapy may in the near future do away with the necessity of vaccinoprohylaxis.]

W F Harvey

BURROWS, W, MATHER, Adaline N, MCGANN, Virginia G & WAGNER, Sylvia M
Studies on Immunity to Asiatic Cholera. II. The O and H Antigenic Structure of the Cholera and related Vibrios. *J Infect Dis* 1946, Sept-Oct, v 79, No 2, 168-97 [Numerous refs]

A very important contribution to the controversy as to what is the true

"AB", AC and ABC vibrios respectively. The argument is set out under the heading "Discussion"—a summary further presents its condensation and the "Conclusions" are clear and eminently acceptable. The *Vibrio cholerae* possesses H and O antigens but the components of the H antigen are distributed at random over cholera and non-cholera vibrios and have no differential significance. Serological analysis was largely restricted to the thermostable somatic O antigen of Inaba and Ogawa vibrios although the "intermediate" Hikojima receives due attention. The Inaba and Ogawa vibrios, as well as some of the El Tor vibrios, belong to Gardner and Venkatraman's immunological type O1. Investigation of the structure of the O antigen showed that it included only 13 components to which were allotted the letters A to M, and of these A, B, C, D and E were associated with the Japanese type vibrios. This association was narrowed further to A, B, C, of

Important among the conclusions reached are that :—(1) " The O group I of Gardner and Venkatraman is characterized by the presence of a group-specific antigen A." (2) " There was no immunological distinction between cholera vibrios and El Tor vibrios of O group I." Ample references to the literature are given.

W. F. Harvey.

CHU, L. W., HUANG, C. H., CHANG, C. T. & KAO, H. C. Sulfonamide Drugs in the Treatment of Cholera. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 825-30. [12 refs.]

Three groups of cases came under observation in this series, all adults receiving treatment within 72 hours after onset. Intravenous infusion of physiological salt solution was used to correct dehydration and 2 per cent. sodium bicarbonate or 10-20 per cent. glucose were used whenever indicated. The sulphaguanidine group comprised 25, the sulphadiazine group 25 and the control group without sulphonamides 29 patients. One death is registered in the control group and one in the sulphaguanidine group. Claim is made that in the sulphonamide group, as compared with the controls, the "average duration of diarrhoea is shortened" and "the average amount of intravenous saline given is reduced." Little or no difference was shown in results between sulphaguanidine and sulphadiazine and neither of the sulphonamides appeared to exert any "remarkable effect on the time of disappearance of the cholera vibrios from the patients' stool."

W. F. Harvey.

CHU, L. W. & HUANG, C. H. Effect of Sulfadiazine on Cholera. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 821-3.

"1. In a cholera epidemic, 10 patients were given sulfadiazine in addition to saline infusions with 10 other patients without sulfadiazine treatment as control.

"2. The average duration of diarrhea of the sulfadiazine-treated patients (4.6 days) is shorter than that of the controls (7.1 days).

been emphasized."

REIMANN, H. A., CHANG, G. C. T., CHU, L. W., LIU, P. Y. & OU, Y. Asiatic Cholera. Clinical Study and Experimental Therapy with Streptomycin. *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 631-47, 7 figs. and 4 charts. [15 refs.]

This article, which deals with experience of 2,374 cases and 392 deaths, strikes a refreshing note of scepticism in regard to some orthodox opinions. It certainly, by its questioning, invites attention and investigation. Is contamination of the public water supply the chief cause of epidemic cholera? In the present epidemic, case-to-case transmission seemed to be a more important factor and it resembled dysentery in this respect. If there be real truth in that observation it should lead to concentration on the personal habits of the population for prevention rather than on the "sanitary engineering." Is the mortality of the patients not an exaggeration, "statistically"? That issue is, in the present epidemic, a more satisfactory treatment and its results. The average duration of the disease in 56 patients treated by rehydration and remineralization alone was 4.6 days;

of 30 patients, treated elsewhere, with sulphaguanidine, 3-8 days, of 31 treated with sulphadiazine, 3 days, and of 8 patients with severe attacks, treated with streptomycin, 3 days. Can the apparent shortening of the attacks with sulphonamides or streptomycin be taken as statistically significant? An answer to this and other questions is, perhaps, contained in the statements—(1) "Apart from the existence of endotoxin and the apparent toxemia at the onset of disease, the usual absence of fever, the clear mentality and rapid recovery suggest that dehydration, the loss of salts and the acidosis arising therefrom are far more important factors in causing the later signs, symptoms and fatalities," considering that recovery usually comes so promptly after the restoration of salt and water while vibrios persist in large numbers in the stool" (2) "Cholera if properly treated can be made much less serious than typhoid," as exemplified in the present epidemic where the duration of the attack in 140 patients was reduced to about 4 days and the mortality was only 5 per cent (3) "If the simple administration of salty water reduces the duration of the disease to a few days and the mortality to 5 per cent, there is hardly any need for specific therapy unless it can be shown to abolish the carrier state sooner. Neither the sulphonamides nor streptomycin did." Apart from the criticism that caution is necessary before making too wide generalization from

be described as immediate intravenous infusion of 1 000 to 2 000 cc of warmed physiological salt solution at 60 to 100 cc a minute, the amount being regulated by the size of the patient and the degree of dehydration as measured by the specific gravity of the blood. An addition of 300 cc of 2 per cent sodium bicarbonate solution was added to combat acidosis when collapse was present or threatened."

W. F. Harey

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

PAGE, F. T. Amoebiasis. [Correspondence] *Brit Med J* 1946, Dec 28, 1005-6

Referring to the article by HAYWARD [this *Bulletin* 1947, v 44, 81] on cases of amoebiasis encountered by him in Italy, Page disagrees with that writer on certain points. Frank dysenteric manifestations were common in the Far Eastern theatres of war during active military operations, and were precipitated by the massive infection of debilitated persons suffering from concomitant bacillary infections. Sulphaguanidine stopped the diarrhoea but did not cure the amoebiasis. With unavoidably inadequate treatment the infection became chronic, the lesions became secondarily reinfected by bacteria, and successful curative treatment thus was rendered more difficult until the secondary bacillary invaders had been cleared by sulphonamide and penicillin treatment after the patients' return to the United Kingdom.

By contrast, advanced chronic cases of amoebiasis were rarely seen in India Command either during or after the war, and since the war ended they have seldom been seen in the Far Eastern theatres of operation. Such infections

with *E. histolytica* do not differ in their course and response to treatment from those encountered elsewhere under parallel conditions; and now, in India, the usual case is akin to that described by Hayward in Italy.

The diagnosis in a chronic case of amoebiasis with an infection localized in the caecum may not be established by examination of a dozen stools, even after

CARRUTHERS, L. B. Pleurisy due to Amoebiasis. *J. Trop. Med. & Hyg.* 1947, Jan., v. 50, No. 1, 12-15. [11 refs.]

"(1) The amoebic hepato-pleuritic syndrome is common at Miraj.

"(2) A series of representative cases is reported.

"(3) The presence of amoebic colitis or of amoebic hepatitis in the course of pleuritis justifies a trial of emetine in the treatment of the pleurisy."

RUSSELL, H. K., EISENHOWER, E. W. & ROOSE, D. J. The Influence of Combat on the Incidence of Intestinal Parasites. *U.S. Nav. Med. Bull.* 1946, Nov., v. 46, No. 11, 1716-18.

The intestinal parasites of three groups of men are compared: one group had been subjected to combat conditions on islands (Palau) which the Japanese had occupied recently; a second group had been stationed at an advanced base for 18 months, and the third had recently arrived from the United States as replacements. There were 100 men in each group.

A single stool was examined by "direct smears", one in saline and one in iodine, and by a concentration floatation method. A list of the parasitic findings in the three groups is given, this includes nine helminthic species (including *Heterodera radiculicola*) and eight protozoan species. The "combat" group showed a heavier infection of all the commoner pathogenic parasites; for example, *Entamoeba histolytica* was found in 23 of this group, compared with 6 and 3 for the "advanced base" and "replacement" groups, respectively; and hookworm infection in 25 compared with 4 and 6. Other figures were *Giardia* 6, 1 and 3: *Ascaris* 6, 3 and 4: *Trichuris* 8, 3 and 2: and *Strongyloides* 7, 0 and 1. There was a high incidence of *E. coli* and *E. nana* in all three groups, the percentages being 32, 21 and 19, and 14, 9 and 11, respectively.

Among 57 patients "admitted to the gastro-intestinal service" during the same period, the percentage infection rates of the above-mentioned parasites were *E. histolytica* 37, *E. coli* 31, *Giardia* 5, hookworm 21, *Strongyloides* 9, *Ascaris* 9, and *Trichuris* 5.

It was found that the infection rates of the three groups were 15.5 and 32.5 per cent., respectively.

These islands were very insanitary and there was a high incidence of parasitic infection amongst Japanese prisoners. Living on these islands under combat conditions naturally subjected the men to heavy infections.

[There is no suggestion in this paper that actual combat influenced the infection rate; the title is, therefore, misleading.] L. E. Napier.

See also p. 470, BAROODY. Modification of the Faust Method in the Detection of Cysts and Ova.

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

PELTIER M La fièvre récurrente à poux en Afrique Occidentale Française
Epidémie ancienne—Menaces actuelles [Louse-borne Relapsing Fever in
French West Africa Past and Present Significance] *Bull Méd de l'Afrique
Occidentale Française* 1946 \ 3 No 1 21-7 [15 refs]

SICAULT G Considerations sur l'épidémie de la fièvre récurrente mondiale au
Maroc [Considerations on the Epidemic of Cosmopolitan Relapsing Fever
in Morocco] *Bull Inst Hyg Maroc* 1944 \ 4 5-25 3 charts

This epidemic of louse-borne relapsing fever spread from Tripolitania early
in January 1945 and travelled from east to west across Morocco. The number
of cases in the Protectorate gradually rose from a total of 162 in February 1945
to a maximum of 5 027 cases in January 1946. The total number of cases
recorded in 1945 was 27 780 and 13 192 in the first three months of 1946. The
mortality averaged 5.03 per cent. In any particular district the epidemic

they usually developed during the relapses. Treatment with arsenicals
especially novarsenobenzol in progressive doses—0.30, 0.45 and 0.60 gm at
intervals of 2 to 3 days—cut short the initial attack and prevented relapses in
the majority of cases. The use of trivalent arsenic is not recommended
however when hepato-renal complications are present. The distribution of
food by the Government helped to check the severity of the outbreak and the

BERGERET C & RAULT A La fièvre récurrente à tiques à Dakar. Clinique
thérapeutique [Clinical and Therapeutic Aspects of Tick-borne Relapsing Fever
at Dakar] *Bull Méd de l'Afrique Occidentale Française* 1946 \ 3 No 1
29-56

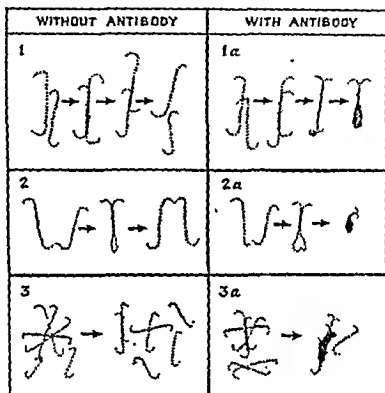
YOUNG W A FARR A G & McLENDRICK A J Relapsing Fever in the Lake
Province of Tanganyika with an Account of a Case in an Eight Day Old Infant.
East African Med J 1946 Nov \ 23 No 11 345-7

GARDNER A D Agglutination of *Leptospirae* *Lancet* 1947 Jan 4
20-21 1 fig

Two wire loops are required one about 3 mm in diameter and the other
1 mm diameter so as to deliver a volume about one-tenth that delivered by the
larger loop. A suspension of a living culture of suitable leptospira 4 to 7 days
old in some standard medium is used for the test. The culture should be rich
enough to show at least 10 organisms in a 1/12 in dark ground immersion field
in a wet film. If it contains more than 20 per field the suspension should be
diluted. The serum to be tested is used undiluted, diluted 1 in 10 and 1 in 100
respectively. With the larger loop a loopful of the living suspension is placed
on a slide and then a 1 mm loopful of the 1 in 10 dilution of the serum giving a

dilution of 1 in 100. A number 0 coverslip is placed over the fluid and the preparation examined under dark ground illumination. If agglutination is observed, a 1 in 1,000 dilution is tested; if negative, undiluted serum is used. It is also desirable to test dilutions intermediate between a positive 1 in 10 and a negative 1 in 100, or positive 1 in 100 and negative 1 in 1,000, in order to obtain a sufficiently precise titration to detect a subsequent rising or falling titre.

For control purposes, it is advisable to test the culture for agglutinability



Movements of living leptospirae in fluid culture-medium: 1, two leptospirae entwining and disengaging; 1a, two leptospirae entwining and becoming agglutinated; 2, a dividing leptospira; 2a, a dividing leptospira; 3, a fortuitous aggregate of leptospirae becoming agglutinated.

[Reproduced from the *Lancet*]

with a known positive serum, if all the tests on a given day are negative. Similarly, if all the tests are positive the culture is agglutinated.

ii. *Leptospira* are used.

E. Hindle.

WITTEBOLLE, P. & NIEMELGERS, L. Photodynamie et Leptospirae. [Photodynamie and Leptospira.] *Rev. Belg. Sci. Méd.* 1942, Mar., v. 14, No. 3, 79-88. [54 refs.]

The authors studied the effect of light on the susceptibility of three strains of *Leptospira* to the action of various substances, including argo-flavine, sodium salts, and compounds containing arsenic, bismuth, mercury and antimony, respectively.

[April 1947]

Tropical Diseases Bletin

The strains used included *Leptospira icterohaemorrhagiae*, *L. caricola* and *L. biflexa*. The suspensions and mixtures were examined by dark ground illumination using an arc lamp of 4.5 amp.

In the presence of argo flavine the *Leptospira* were immobilized approximately ten times more rapidly when exposed to the arc lamp (at 20 cms distance) than similar suspensions kept in the dark. Thus *Lep ospira* in a concentration of 1/100 000 in the dark required a period of 3 hours before being immobilized whilst if exposed to light only 15 minutes. This photodynamic action was shown to depend not on any heating effect nor on the direct effect of the visible light or ultra violet rays.

Lep ospira were exposed to the light of the arc lamp and subsequently mixed with various dilutions of argo flavine. Even when these preparations were kept in the dark the argo flavine immobilized the organisms as rapidly as similar dilutions exposed to light. Irradiated argo flavine was found to be no more toxic to *Leptospira* than the ordinary compound. On the other hand irradiated argo flavine when mixed with *Leptospira* in the dark showed the usual reduction in its germicidal properties.

The photodynamic effect is not the result of the fluorescent properties of the argo flavine for similar results were obtained with 25 non fluorescent substances including compounds of sodium, arsenic, antimony, bismuth and mercury details of which are given in tabular form.

In these experiments *Leptospira* after becoming immobilized were found to have lost their power of reproduction. E Hindle

ROBERTSON, K. Weil's Disease a Rare Condition. Brit Med J 1946 Vol 30 910-13

The first case of Weil's disease observed by the author occurred in July 1936 and since then 4 or 5 cases have been seen each year all occurring in the same area of South Hampshire. The patients included persons of all ages from 5 to 75 years and in nearly every case the infection was the result of bathing or working in water containing the infective organism. It is assumed that the water becomes contaminated by the urine of rats infected with the disease since in Britain about 40 per cent of rats are carriers of *Leptospira icterohaemorrhagiae*.

The clinical symptoms are briefly described and it is emphasized that half the cases showed no jaundice at any stage and among these the incidence of leptomeningitis was very high. *Leptospirae* were only once isolated—by animal inoculation of the patient's blood—but such diagnostic methods are considered unnecessary. The development of antibodies after the first 5 or 6 days with gradual increase in titre enables the disease to be diagnosed by serum agglutination tests. Such tests were carried out by Dr Broom and his colleagues at the Wellcome Research Institution and the results showed the importance of examining sera at various intervals in order to detect rising titres. At least half the cases were diagnosed within the first four days but in the more severe cases the first positive findings were delayed for some days up to the 8th or 9th day in fatal cases. Twelve of the patients were given anti leptospiral serum during the first four days of illness and one received penicillin within the first two days. All these survived whilst out of 20 cases not treated until after the 4th day there were six fatalities. Details are given of two other severe cases successfully treated with penicillin supporting the view that in early stages of the disease penicillin is likely to be more useful than serum.

The author adds certain points concerning general treatment. Immediately this disease is suspected the patient should be put on a low protein diet, fluid pressed and glucose given freely. The urine should be rendered alkaline by the

use of potassium citrate, and a careful intake and output record kept for each 12 hours. In severe cases heat and even short-wave diathermy of the renal areas is used, and sometimes hot colonic irrigation. High spinal analgesia was used in three desperate cases to re-establish renal function and succeeded in one, but not in the other two patients. Finally, the opinion is expressed that the mechanism of cortical renal ischaemia is of great importance in the aetiology of the syndrome of water and this suggests the need for earl oliguric cases.

E. Hindle.

BOIRON, H. La leptospirose existe-t-elle en A.O.F. ? [Does Leptospirosis exist in French West Africa ?] *Bull. Méd. de l'Afrique Occidentale Française*. 1946, v. 3, No. 1, 135-8.

The author gives a brief summary of previous work on Leptospirosis in Africa, and then describes certain cases which suggest that the disease exists in Senegal and other parts of French West Africa.

On two occasions, LLOVEROL at the Pasteur Institute of Kindia isolated leptospira from the blood of patients suffering from bilious complaints, but did not succeed in maintaining the organism in culture. In 1945, the author examined the blood of his laboratory animals' attendant, who had shown symptoms of jaundice associated with fever 20 days previously, and found that his serum agglutinated *L. icterohaemorrhagiae* at 1:100, and gave a partial reaction at 1:1,000. *L. canicola* was also agglutinated in similar dilutions, whilst negative results were obtained with other strains. In 1946, the blood of a dog that died with symptoms suggestive of this disease gave a partial agglutination of *L. canicola* at 1:100 and 1:1,000. The serum of a second dog dying after six days illness with symptoms of gastro-enteritis, gave complete agglutination up to dilutions of 1:1,000 and partial at 1:10,000, also complete lysis at 1:10 against *L. canicola*.

These dogs, and also the laboratory attendant, had never left Senegal, and the findings support the view that leptospirosis exists in this part of Africa.

E. Hindle.

BOUNDS, L. H. & KINGERY, R. M. Weil's Disease. Report of Eleven Cases. *U.S. Nav. Med. Bull.* 1946, Dec., v. 46, No. 12, 1808-12.

PACKCHANIAN, A. & PRICE, T. G. Coexistence of the Antibodies of Yellow Fever and Weil's Disease in Human Serum. *Texas Reports on Biol. & Med.* 1946, v. 4, No. 3, 364-7. [11 refs.]

The authors received 94 samples of serum, from persons in Brazil, which contained antibodies as a result of attacks of jungle yellow fever; these were examined for evidence of Weil's disease by microscopic agglutination tests against Type contained antibod : 100 to 1:1,000 ;

E. Hindle.

LEPROSY

IBARRA PÉREZ R & GONZÁLEZ PRENDES M A Incidencia de la lepra según el sexo en Cuba [Sex Incidence of Leprosy in Cuba] Marianao Cuba *Rev Sifilografía Leprologia y Dermatología* 1946 July \ 3 No 3 117-19

That more mal
it is ascribed to
their greater soci
tions of men and women are the same or very similar the difference in incidence
is much less marked
ratio as 1 5 : 1 among 4
Cuba in 1946 it was 1
provinces Among arr

134 in Oriente 1 6 : 1
4 : 1 among 508 and
ital patients the pro-

portion was 2 5 male to one female

Taking hospital and ambulatory cases together the totals are 1 710 males
to 1 125 females or 1 52 : 1 as stated above

H Harold Scott

DHARMENDRA & SEN N R *Leprosy Bacilli in the Nose of a Neural Case with Bacteriologically Negative Skin Lesions* *Leprosy in India* 1946 July \ 18 No 3 88-90

IGNACIO CHALA H J Lesiones dermatológicas y nerviosas en la lepra tipo tuberculoide [Cutaneous and Nervous Lesions in Tuberculoid Leprosy] *Rev Facul de Med Bogotá* 1946 July \ 15 No 1 9-74 18 figs [60 refs] English summary

[This is a ful
skin lesions in
disease in Color
would do well to consult the original The nervous lesions though mentioned

tion he prefers to divide patients into lepromatous tuberculoid and the non characteristic in which he would place the prelepromatous and the pretuberculoid Section II which is \ treats clearly and without redundancy of lesions in the skin and the subcutaneous erythematous maculae the dyschromic erythematous patches the papular and tuberculoid forms the miliary and perifollicular lichenoid lesions and the sarcoid types and nodular elements They differ fundamentally from the reddish pigmented maculae of the nervous form and may be classified into four main types which may be further subdivided 1 Macular infiltrated erythematous patches with well marked border hypochromic centres where the skin appears to be almost normal with an erythematous periphery This common form is frequent and important for early diagnosis 2 Papuloid and adults resembling ous sarcoids

The author next treats of lesions other than those of the skin in tuberculoid leprosy, such as those of the peripheral nerves, the mucous membranes, glands and bone and the "tuberculoid leprosy reaction" usually of brief duration. In Section IV the dermatological aspect of tuberculoid leprosy in infants is specially considered. In infants the nodular, papular and tuberoid forms may all be seen; in children over two years of age the papuloid is the most common. It evolves slowly and after some months softens and lessens in size and may die away leaving only a reddish rugose macula. Later still these lose their colour, the skin becomes thin and a depressed scar-like lesion with a definite edge remains, the so-called "vermicular scar of Rabello." Other forms not infrequent in infant tuberculoid leprosy include the lichenoid with isolated or confluent follicular papules in the middle of apparently healthy skin on the arms or buttocks, associated sometimes with dyschromic patches.

Section V is devoted to the diagnosis of tuberculoid leprosy from lupus

In general, this tuberculoid form of leprosy is the "clinical expression of a specific resistance to leprosy infection" and bacilli are usually few. The lepromin test is positive and diagnosis is aided by the concomitant presence of changes in peripheral sensation. The histamine test is of diagnostic value in some cases. If neuritis occurs in the tuberculoid type a neuroma, a sort of "tuberculous gumma", will be found in the nerve involved. These tuberculoid cases are not infective and therefore constitute no menace to the public health.

H. Harold Scott.

GARCIA MIRANDA, A. Valor de la prueba de la lepromina. [Value of the Lepromin Test.] *Rev. Sifilografía, Leprología y Dermatología*. Marianao, Cuba. 1946, July, v. 3, No 3, 120-25. [14 refs.]

Several forms of antigen have been used for the intradermal test for leprosy: Mitsuda-Hayashi's lepromin prepared from lepromata and containing Hansen's bacilli and tissue debris; bacillary lepromin, a suspension of bacilli only; soluble purified lepromin extracted from the bacilli; a suspension of the antigen in oil; and 2-4-dinitro-chloro-benzene.

The results of tests by the Mitsuda and the Mantoux reactions were: In leprosy subjects, discordant. In non-leprosy subjects, the Mitsuda reaction was positive in 78 per cent., as high as that observed in countries where leprosy is endemic and the two reactions were found to coincide [see below]. In patients with cutaneous tuberculosis the Mitsuda and the Mantoux tests gave the same results. Lastly, 123 children negative to both tests were vaccinated with BCG. In a month the Mantoux reaction was positive in all but one, the Mitsuda was positive in 87 (70.7 per cent.), weakly positive in 26 (21.1), negative in 10 only (8.1 per cent.). Again, in a person believed to be free from leprosy, infection with *Myco. tuberculosis* may provoke sensitization to leprosy antigen.

The author sums up his conclusions by saying that the lepromin test is of great prognostic value and is a gauge of the body's defence; it has much value prophylactically, a negative result signifying absence of powers of resistance; the Mitsuda reaction is an allergic one and if positive in non-lepers it is due to sensitization by *Myco. tuberculosis*. Intradermal injection with whole lepromin will bring about resistance to the leprosy bacillus, i.e. it is of prophylactic use, the reaction to lepromin is of assistance in diagnosis of leprosy lesions from those which may be confused with them; dinitrochloro-benzene acts equally as well

Bulletin 1944 v 41 945] He and his colleague decided to study the question afresh and they examined 86 cases one worker carrying out Fergusson's chemical method and the rectum and 32 by the his

Jaffe had said the liver Ottolima and Attencio the rectum and sigmoid Examining them by both methods the authors found 33 in which the liver was invaded and 34 the rectum—no real difference They maintain that the lesions of the liver (and heart) are not due to the presence of ova but to the toxins of the worms either directly or by allergy the latter being in their opinion the more likely In the intestine the lesions are more usually diffuse the result of the toxin of the parasite while the ulcers are due to occlusion of the capillaries by accumulation of ova Furthermore the ova are mostly in nodules in the intestinal wall or free in the tissues which show no signs of tissue reaction and as a matter of fact ulceration of the bowel is very rare in schistosomiasis in Venezuela
H Harold Scott

HERNÁNDEZ MORALES F OLIVER-GONZÁLEZ J & PRATT Caroline K Treatment of *Schistosomiasis mansoni* with Neostilbosan *Proc Soc Exper Biol & Med* 1946 Oct v 63 No 1 218-19

There is evidence indicating that the drug has parasitotropic effects

KUNTZ R E & STIREWALT M A Effects of DDT on Cercariae of *Schistosoma mansoni* *J Parasitology* 1946 Dec v 32 No 6 529-38 1 fig

The experiments were carried out in order to determine to what extent DDT could be relied upon for emergency schistosomiasis control by killing cercariae and thus providing temporary protection for military personnel in endemic schistosome regions The work was carried out with laboratory bred molluscan hosts *Australorbis glabratus* (= *Planorbis guadalupensis*) which were injected with miracidia of *S. mansoni* the resultant cercariae being used to infect

armed with the cercaricidal properties of concentrate (DDT 20 gm xylene 60 ml) were performed to demonstrate the toxicity xylene-Triton emulsion concentrates which

were diluted and aged for a period prior to use (b) crystalline or powdered DDT in water and (c) DDT applied in oil films on the surface of water All the tests were carried out under laboratory conditions and the conclusions regarding the cercaricidal value of the various emulsions tested were based on the survival time of exposed cercariae and on the number of worms recovered from hosts infected with treated cercariae as compared with the number recovered from animals infected with untreated cercariae

The authors summarize their results as follows —

1 DDT (dichloro-diphenyl trichloroethane) powder DDT in oils and in xylene-Triton emulsions and Triton were tested to determine their effect on

cercariae of *Schistosoma mansoni*. The results indicated that DDT alone or in any of the preparations tested was not sufficiently cercaricidal to be of practical value in the control of schistosomiasis.

"2. If DDT is to be employed (in quantities recommended for mosquito control) for the mild cercaricidal action it possesses, its action is enhanced when it is incorporated in certain emulsions. For example, the emulsifying agent, Triton, itself incapacitated or immobilized the cercariae. A mixture of Triton and xylene is more toxic than Triton alone and the mixture is made still more lethal to the cercariae upon the addition of DDT. There is a tendency toward loss of toxicity of DDT-xylene-Triton and xylene-Triton emulsions upon standing or aging in open containers.

"3. Cercariae, although severely affected and partially immobilized by DDT-xylene-Triton and xylene-Triton emulsion concentrates, are potentially infectious schistosomes until near death. A small but dangerous percentage of cercariae treated *in vitro* with the emulsions and placed in water will revive sufficiently to infect a host."

That DDT would probably prove even less efficient if tested under field conditions is emphasized by the authors who write, "In evaluating the toxicity of DDT it must be realized that tests were performed under laboratory conditions. Under such conditions the toxic agent exerts its maximum effectiveness upon the cercariae and death is further accelerated by such factors as traumatic injury by handling and alteration of temperatures (KRAKOWER, 1940, and BRADY and JONES, 1945). Obviously, in the field, dosages as tested in these experiments would be less effective because of the influencing factors common in natural waters." This is an important paper, in which the conclusions are based on a large number of carefully controlled experiments: it should be consulted in the original by all those who are interested in schistosomiasis.

R. M. Gordon.

BANG, F. B., HAIRSTON, N. G., GRAHAM, O. H., FERGUSON, M. S.; SULLIVAN, R. R. Studies on Schistosomiasis Japonica. I. Introduction [By the authors]. *Amer. J. Hyg.* 1946, Nov., v. 44, No. 3, 313-14. II. Methods of Surveying for Schistosomiasis Japonica [BANG, HAIRSTON, GRAHAM & FERGUSON]. *Ibid.* 315-23, 3 figs. [12 refs.] III. An Epidemiological Study of Schistosomiasis Japonica [SULLIVAN & FERGUSON]. *Ibid.* 324-47, 11 figs. (1 map). IV. Chemotherapy of Experimental Schistosomiasis Japonica [BANG & HAIRSTON]. *Ibid.* 348-66, 4 figs. [11 refs.] V. Protection Experiments against Schistosomiasis Japonica [FERGUSON, GRAHAM, BANG & HAIRSTON]. *Ibid.* 367-78, 2 figs. [14 refs.]

I. The following papers are the result of studies on schistosomiasis japonica carried out from October 1944 and through 1945, in the Philippine Islands and Japan. The greater part of the work was done in Leyte, where schistosomiasis proved to be of considerable military importance.

II. Surveys for schistosomiasis may be undertaken for two purposes: to ascertain, (a) whether the infection is present in a community, or (b) if present, how much it occurs and how severe the problem is.

During this work, it has been shown that it is possible for 50 per cent. of the population to be infected and yet for the infection to be unrecognized by local physicians. The data were collected in the Visayan Group of the Philippines (Leyte and Samar) and in one well-recognized focus in Japan (Kofu, Yamanashi Province).

For the recognition of eggs in the faeces, a sedimentation method was employed by passing the emulsified stool through 3 layers of gauze in a conical urine glass. Unless this method is used a large proportion of infections will be

were present in the testes of the male After 6 weeks treatment all the remaining worms were found in the liver or in branches of the portal vein

were capable
t the number
he eggs which

have been laid in the intestine and their development gave information as to

egg deposition has occurred within the previous 2 weeks

After 6 weeks the guineapigs failed to show any immature eggs indicating that egg deposition had ceased in 4 weeks

Among the three trivalent compounds tested tartar emetic produced a greater decrease in the number of worms and anthiomaline and Fouadin followed in that order Neostam given in comparable doses of weight of antimony had little if any effect Emetine on the other hand failed to change the average egg-count in the mucosa and in only one case were any morphological effects on the worm demonstrated The combination of emetine and Fouadin had no special advantages Atebrin had no effect Antimony had no direct effect on the egg so that the influence of these drugs

drug

The increased efficacy of 6 weeks Fouadin treatment is reflected in the greater drug concentration The higher concentration in the hamster liver is not correlated with drug effect

which over several hours would prevent from 100 to 200 active cercariae

waters for only a brief period is highly dangerous Washing exposed parts of the body with a liberal supply of soap after even a short exposure and subsequent washing with little or no soap preventing infection grease offer no

and the 45-45-10 mixture* are all effective when used on the skin for a

*45 per cent benzyl benzoate 45 per cent d butyl phthalate 10 per cent Tween 80 emulsifier

considerable time even after several periods of immersion. The ease with which they can be applied to the skin and the fact that they are colourless liquids without offensive odour, recommend their use.

When protection afforded by untreated clothing is considered, certain military fabrics are probably of considerable value. In all tests, olive drab woollen trouser cloth, even when old, allowed no penetration of cercariae. Even then, different samples of the same material gave different results according to the looseness or otherwise of the weave. However, during the cold season there is less chance of troops becoming infected whilst wearing woollen uniform, as the snail hosts are then hibernating.

Cotton uniforms are worn during the periods of greatest snail activity and therefore their related protective value is important. *In vitro* tests revealed that Byrd cloth is highly protective (a special cloth, first developed for cold and wind resistance and later found to be resistant to bites of mosquitoes).

Cotton khaki (8 ounces per square yard, thread count . 116 \times 56 inch) and herring-bone twill (8.5 ounces per sq. yard, thread count . 72 \times 46 per inch) allowed some penetration, even when new, but were more porous when worn.

The protection afforded by untreated cotton trouser material, that part of the uniform most likely to come into contact with cercariae, is small. The drying which takes place after exposure may diminish the risk, as cercariae are unable to live in the absence of sufficient water to cover them.

It is therefore concluded that soldiers, who enter water in uniforms impregnated with dibutyl phthalate, benzyl benzoate and 45-45-10 mixture, and

impregnated socks are worn and the trousers kept tucked inside combat boots, thus eliminating the possibility of large volumes of water getting in directly under the bottom of the trousers to gain contact with the skin.

P. Manson-Bahr.

HOLLANDS, R. A. & PALMER, E. D. Observations on the Pathology of Schistosomiasis Japonica : Diagnosis by Rectal Crypt Aspiration. *J. Parasitology*. 1946, Dec., v. 32, No 6, 525-8. [10 refs.]

The specific diagnosis of schistosomiasis japonica is commonly made only by demonstration of eggs in the faeces. For many reasons this is often unsatisfactory and many are missed.

As in the case of *S. mansoni* the eggs are to be found in the rectal mucosa and there is much evidence that there is no definite anatomical pattern to the

tipped glass pipette connected with a motor-driven suction pump, developing 20 inches of mercury vacuum, any suspicious lesion was scraped and aspirated and, in the absence of lesions, this method was applied to large areas of the normal rectal mucosa. Collected material was washed back into a vial with tap water. The suspension was later spun down and sediment pipetted to a slide and examined.

Each specimen of faeces was subjected to three techniques—zinc sulphate concentration, direct smear (preferably from mucus or blood), and sedimentation by centrifugation.

Seven of 24 suspects were proved to be infected, by both diagnostic methods. Four of the seven were diagnosed by crypt aspiration alone after an average of 4.5 negative stools.

The seven proved cases were submitted to 31 sigmoidoscopies. In three, the appearances were consistently normal; the four others were marked by a variety of quickly changing superficial lesions from the distal rectum to the limit of visualization at 25 cm. It was noted that institution of tartar emetic treatment effected no improvement until more than 0.4 gm. of antimony had been given.

The most common lesions were ephemeral clusters of dry petechiae, 1×1 mm., on an otherwise normal mucosa. These were located 5 to 25 cm. above the internal sphincter. This small series indicates that rectal crypt aspiration affords the most reliable and time-saving technique for diagnosing schistosomiasis japonica.

P. Manson Bahr

HUNTER G. W., INGALLS J. W. & COHEN Manna G. Comparison of Methods for Recovery of Eggs of *Schistosoma japonicum* from Feces. *Amer J Clin Path* 1946 Nov. 16 No. 11 721-4

"Our study of the comparative value of various techniques in the examination of stools for *Schistosoma japonicum* eggs. Weller and Dammon with acid-ether method was on by their subsequent acid-Triton NE-ether method."

"A new sodium sulfate modification of the acid-Triton NE-ether method yet devised this method."

KAY, J. W. & PRATT, J. H. A comparison of methods for the recovery of eggs of *Schistosoma mansoni* from feces. *Am J Clin Path* 1946 Nov. 16 No. 11 725-8

The authors used an antigen supplied by Oliver Gonzalez [see OLIVER GONZÁLEZ & PRATT this *Bulletin* 1946 v. 43 348] and prepared from the cercariae of *Schistosoma mansoni* discharged by snails into distilled water. The cercariae were centrifuged, washed, dried, weighed and extracted in cologne.

... were read ... ignored ... ions were ... ring from ... mansoni ... eated for ... schistosomiasis. Positive skin tests were given by 23 (40 per cent) of 57 men.

whose stools had been reported positive overseas but were negative to repeated examinations after their return to the United States. The group showing positive reactions had had an average of 61 cc. of foudadin, while those showing negative reactions had had 48 cc., a difference without statistical significance. Nor was there any significant correlation between the results of the skin tests and the time which had elapsed since the last treatment. CULBERTSON [this *Bulletin*, 1942, v. 39, 355] (*Immunity against Animal Parasites*, 1941, Columbia University Press) quotes the conclusion of "FAIRLY and WILLIAMS" that positive skin reactions persist for years after there is no need for treatment. The skin tests done by the present authors with the 1:5,000 dilution of the antigen became negative in at least 60 per cent. of cases within 6 months after the end of treatment. ALVES & BLAIR [this *Bulletin*, 1946, v. 43, 344] have reported that 85 per cent. of 53 patients treated for infestation with *S. haematobium* and *S. mansoni* developed negative skin tests to cercarial antigen 2 to 3 months after the end of treatment.

The authors did skin tests on patients suffering from schistosomiasis 30 days or more after the end of treatment, the stools and skin tests having been positive before treatment. Among these patients 49 had had 1.8 to 2.09 gm. of tartar emetic and 25 of them still had positive skin tests 30 to 90 days after the end of treatment, while 24 were negative. The stools were examined 3 times a week for 90 days or longer after treatment had ended. Stools were found among the 24 patients while positive stools were found among the 24 patients treated with 100 cc. of foudadin during treatment and stools.

The authors maintain that the skin test is easier and quicker than the examination of stools and that, although the accuracy of the skin tests is often doubted, skin tests for schistosomiasis show a high degree of specificity for trematodes. Because the skin test does become negative in many people in a relatively short time after the end of treatment with antimony, it is a valuable aid in determining whether treatment has been effective.

G. Lapage.

WEINBERG, H. B. & TILLINGHAST, A. J. The Pulmonary Manifestations of Schistosomiasis caused by *Schistosoma japonicum*. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 801-9, 3 figs.

- "(1) Two cases of acute schistosomiasis caused by *S. japonicum* are presented. Both showed prominent pulmonary manifestations. One patient died, apparently due to tartar emetic administered intravenously in treatment, and post-mortem examination was made.
- "(2) The clinical manifestations of pulmonary involvement were cough with expectoration of scant mucoid sputum, chest pain, and scattered rales of no fixed type.
- "(3) The roentgenographic appearance was that of a miliary tuberculosis. The patient who recovered there was relatively rapid and almost complete disappearance during the period of observation.
- "(4) Pathologically the lung examined at autopsy was studded throughout with pseudo-tubercles, each about a schistosomal ovum as a nidus. In addition large amount of alveolar exudate, including cellular elements, was present.
- "(5) It is suggested that the pulmonary manifestations seen in the first or 'incubation' stage of this disease may actually be due to the localization of in these tissues."

INGALLS J W Jr The Control of Schistosomiasis Japonica III Studies on the Longevity of Cercariae of *Schistosoma japonicum* In Saline Solutions
J Parasitology 1946 Dec \ 32 No 6 521-4

Insofar as the hazard of exposure to *S japonicum* cercariae is concerned sea water with a 3 per cent salinity may be considered absolutely safe for bathing since it provides complete kill of the cercariae in less than three minutes. Areas in which sea water is diluted to less than 1.5 per cent salinity by river waters infested with these cercariae must be considered as potentially dangerous. The exact point between sea water salinities of 1.5 per cent and 3 per cent where absolute safety is afforded was not determined in these tests. It will depend upon the infectivity of those cercariae able to survive for a period in such solutions.

HELVIG E B & BROWN R G Clonorchiasis Report of Two Cases *Amer J Clin Path* 1946 Nov \ 16 No 11 714 20 6 figs

FRIESS Distomatose hépatique et fasciola hépatique Infestation familiale [Hepatic Distomatosis due to *Fasciola hepatica* in a Family] *Algérie Méd* 1946 May June No 3 247-53

The author describes in some detail the infestation with *Fasciola hepatica* of three members of a family resident in Algeria. The father suffered from loss of 4 kilogrammes of weight and fever varying from 37.3°C to 39.2°C with anorexia, an eosinophilia of 40 to 56 per cent and 3 million red blood cells per cmm of blood. Examination of the stools and of blood films failed to reveal parasites and a general examination failed to reveal anything likely to cause the symptoms. Eventually Hodgkin's disease was suspected, the liver and spleen were found to be enlarged. The medullogram showed 70 per cent of eosinophils but no abnormal cells were found. The patient subsequently regained weight but the liver and spleen remained enlarged. Exploratory puncture gave a fluid (presumably the cerebro-spinal fluid) containing 95 per cent of eosinophils and some monocytes. Splenic puncture showed a great increase of eosinophils to 70 per cent but no other abnormalities. The stools were still negative but there was now a leucocytosis of 39,000 with 4 million erythrocytes per cmm of blood, 70 per cent of blood eosinophils, some anisocytes and polychromatophilia and some erythrocytes with basophilic granulations. Duodenal intubation was not possible because the patient could not swallow the sound.

Examination of the patient's daughter showed an eosinophilia of 20 per cent, this child who was in good health had had taeniasis 2 years earlier. Eggs of *F. hepatica* were found in the child's stools. They were then also

infected snails were transferred with them.

The differential diagnosis, prognosis and treatment are discussed. Another patient had been previously treated by the author with carbon tetrachloride.

days 10 centigrammes of calomel before the stools are examined for eggs of *Fasciola*; but he considers that duodenal intubation is the method of examination of choice.

G. Lapage.

ADDIS, C. J., JR. & CHANDLER, A. C. Further Studies on the Vitamin Requirement of Tapeworms. *J. Parasitology*. 1946, Dec., v. 32, No. 6, 581-4.

ADDIS, C. J., JR. Experiments on the relation between Sex Hormones and the Growth of Tapeworms (*Hymenolepis diminuta*) in Rats. *J. Parasitology*. 1946, Dec., v. 32, No. 6, 574-80.

GODFREY, L. W. Hepatic Hydatid Cyst causing Suprarenal Haemorrhage. *Brit. Med. J.* 1947, Feb. 1, 181, 1 fig.

MATILLA, V., COVALEDA, J. & APARICIO GARRIDO, J. El parasitismo intestinal por vermes entre la población indígena de Fernando Po. [Intestinal Worm Infestation among the Natives of Fernando Po.] *Med. Colonial*. Madrid. 1946, Dec. 1, v. 8, No. 6, 415-22, 1 fig.

Investigation of intestinal worms among the native inhabitants of Santa Isabel, Fernando Po, revealed that parasitic infection by worms was present in 93.2 per cent. of cases. *Ancylostoma duodenale* was present in 80.5 per cent.; *Ascaris lumbricoides* in 51.4 per cent.; *Necator americanus* in 8.7 per cent.; *Trichuris trichiura* in 12.6 per cent.; and *Diphyllobothrium latum* in 0.97 per cent.

Half of those affected harboured two or more worms, and, in general, although the degree of infection was high in all cases, none of them showed subjective clinical evidence of the associated disease.

H. J. O'D. Burke-Gaffney.

MOST, H., HAYMAN, J. M., JR. & WILSON, T. B. Hookworm Infections in Troops returning from the Pacific. *Amer. J. Med. Sci.* 1946, Sept., v. 212, No. 3, 347-50. [19 refs.]

During routine stool examinations of patients admitted to a military hospital, hookworm infection was found in 6.2 per cent. of 4,300 men who had not been out of the United States and in 11.5 per cent. of 2,500 men who had served in the Pacific theatre; the latter only are considered in this report.

In 210 of the 284 patients, the hookworm infection had been diagnosed (and usually treated) before admission; in 74 the eggs were first demonstrated in the hospital. The stools were examined by direct smear and several floatation and concentration methods, and Stoll counts were made. Treatment was by tetrachlorethylene (3 ml., occasionally 5 ml., in soft capsules) with sodium sulphate purgation the night before and two hours after the dose. Stools were collected up to 4 p.m. and the worms were separated and identified.

Among patients previously treated, the mean egg count in 17 patients with *Necator* infection was 1,900 eggs per gramme of faeces and in 28 with *Ancylostoma* infection it was 2,295. In 15 patients who had not been treated previously, the average egg counts were respectively 2,400 and 3,600 for the two infections. The infections were thus all low, in no case was an egg count above 9,800 eggs per gramme found.

There were no signs or symptoms that could be attributed to hookworm infection. The red cell count was below 4 million in only 10 out of 100 patients and in these the anaemia could be attributed to other causes, e.g. malaria. The average eosinophil count was 10.2 per cent.

Identification of adult worms showed that of 169 infections 69 were *Necator*, 87 *Ancylostoma* and 13 mixed. There is evidence that the *Ancylostoma* infections were acquired overseas.

From the notes of the previous treatments of 100 patients with unspecified hookworm infections it was calculated that 42 per cent were cured by one treatment 62.2 per cent by two 79.1 per cent by three 85.7 per cent by four 95.0 per cent by five and 98.7 per cent by six treatments. Two treatments effected a 55 per cent cure rate among 35 previously untreated patients with *Ancylostoma* infection and an 85 per cent cure rate among 24 with *Necator* infections.

L. E. Napier

STOLL N. R. LOUGHLIN E. H. HARRIS A. H. & CHENOWETH B. M. Jr. A
Study of Hookworm Infection in Navy and Marine Personnel on Guam
Amer J Trop Med 1946 Sept v 26 No 5 687-98

Two groups of men were examined. Group I composed of the Marines who formed the garrison of Guam had arrived soon after the American re-occupation in July and August 1944 and had not been further west. They were examined between 5 and 9 months after their arrival. Group II was composed of Marines who had been on Guam from 5 to 7 months and had previously experienced combat conditions in the Philippines (Leyte) during the rainy season.

Stool samples were obtained. 4 ml of faeces were added to 56 ml of water. They were shaken with glass beads refrigerated overnight and mixed further the following morning. From this sample specimens were examined for hookworm ova by Lane's DCF method and if this were positive egg counts were made from the same sample. In a certain number of cases worm counts were made after treatment (4 ml of tetrachlorethylene usually).

In Group I 1241 men were examined. 71 were positive by the DCF method that is a hookworm incidence of 5.7 per cent. In Group II 742 men were examined of these 253 were positive that is a hookworm incidence of 34.1 per cent. When the data of officers were examined separately amongst 43 of Group I no positives were found and amongst 41 of Group II the percentage incidence was 34.1 identical with that of the total group.

The data were rearranged according to period of enlistment age and home States of the men. Tables are given. In Group I a much higher incidence was found in men coming from the Southern States particularly the Southern Coastal States the incidence being 20.8 per cent among 178 men. There was a slight trend towards lower incidence with increased age and an increased period of service. These facts combined with the fact that the majority of worms were *Necator* suggest that most of these infections were acquired before the individuals reached Guam that is in the United States. There were however instances of *Ancylostoma* infections so that it is apparent that some new infections were acquired in Guam. In Group II however the majority of the infections were *Ancylostoma* (88 per cent showed this genus) and it is apparent that most of these infections were acquired during their combat period in the Philippines.

Most of the infections were very light although there were five times as many moderate and heavy infections in Group II as in Group I.

There was no correlation between the egg count and the haemoglobin percentage in either group. The average haemoglobin of the group in which there were no hookworm eggs found was materially the same as that of the group in which there were over 10 000 per gramme of faeces. Similarly there was little correlation between a high eosinophilia and a high egg count. It is true that the men with the two highest egg counts showed very high eosinophil counts. On the other hand there were instances of high eosinophil counts eg 35 per cent with no hookworm eggs. In one such case however anti-helminthic treatment produced a male *ancylostome* in other cases other helminths were the cause of high eosinophilia.

There is a high incidence of hookworm disease amongst the natives of Guam—90 per cent.; 76 per cent. of the hookworms recovered from the natives after treatment were *Ancylostoma duodenale* and in 62 per cent. of cases this hookworm alone was recovered. But the conditions under which the Marines lived were such that infection was not common.

Leyte is known to be a very heavily infected area with a relatively high proportion of *Ancylostoma*. There, under combat conditions, there was frequent exposure to infection.

There was evidence that in certain cases infection occurred by vicarious means; three men in Group I (predominantly *Necator* infections), who were assigned to laundry duty, showed *Ancylostoma* ova in their stools and in one particular case there was very strong evidence that he obtained his infection through his hands from soiled bed-clothing that had been allowed to stand for several days in a damp condition before being washed. This man noted itching of the skin of his hands followed by episodes of throat irritation with an unproductive cough as well as gastro-intestinal upsets.

Loughlin and Stoll (1946, in the press) have shown that it is possible to become infected from damp clothing which has been lightly smeared with infected faeces and kept for 5 days on Guam. Conditions often occurred where a man wore his own damp clothing for as long as a week, and it seems very probable that re-infection may take place in this way. There was strong evidence of this in the case of three Marines, as immature adult hookworms were recovered after treatment. These men were treated more than five months after their return to Guam following two months in the Philippines. The young hookworms were of a size that indicated that these patients had probably been infected one month previously. Both hookworm species were involved. L. E. Napier.

AVERY, J. L. The Incidence of Filariasis in the Central Philippines. *J. Parasitology*. 1946, Oct., v. 32, No. 5, 497-8.

This paper records the result of a survey of the incidence of filariasis in the native population of the San Pedro Bay (Leyte Gulf) area of the Central Philippines. The greater part of the work was done in Salcedo and Mercedes on southern Samar.

Care was taken to ensure representative sampling of both sexes of all age groups and the results are based on the examination of a single dehaemoglobinized thick blood smear. All microfilariae were identified as those of *Wuchereria bancrofti*. The incidence was as follows:—

Locality	Time of examination	Number of natives examined	Per cent. positive	Microfilariae per positive slide
Tolosa, Leyte ..	Night (9.30-11.30 p.m.)	253	2.8	8.4
Salcedo, Samar ...	Night	300	1.3	3.5
Mercedes, Samar	Night	436	9.6	27.7
" "	Day (12 a.m.-1.30 p.m.)	353	3.4	8.6

in a nocturnally periodic area at midday. This then constitutes a modified periodicity as suggested by AFRICA, GARCIA and LAYCO [this *Bulletin*, 1936, v. 33, 131]. The average number of microfilariae per positive slide show that not

only was the incidence of circulating microfilariae lower during the day in the Mercedes area but the number per volume of peripheral blood was lower

P. Manson Balr

FRANKS M B Specific Soluble Antigen in the Blood of Filarial Patients *J Parasitology* 1946 Aug v 32 No 4 400-406 1 fig

FRANKS CHERNOWETH and STOLL (*Amer J Trop Med* in the press) have of antigens made from larvae as these tests were done chiefly on but they varied so much that the author of the paper here abstracted sought an explanation of these variations They seemed to be influenced by the clinical phase of the disease The most striking difference observed was the fact that during the

filariæmia was probably due to the presence of circulating microfilariae which formed or absorbed the antibody produced

The author set out to explain the variety of dermal responses noted and carried out a number of immunological experiments which are described in detail

The author summarizes his results as follows —

Two antibodies have been demonstrated one specifically directed against the microfilariae the other against the adult filarid The presence of circu

containing this antigen (or antigens) might be utilized for diagnostic tests in filariasis In one experiment the results suggest that this antigen (or antigens) appears in the blood as a tide whose ebb and flow are related inversely to the different concentrations of the microfilariae in the circulation G Lapage

HIGGINS P R A Technique for Xenodiagnosis of Filariasis [Research Note] *J Parasitology* 1946 Aug v 32 No 4 433-4

The author fed *Culex fatigans* and *Aedes aegypti* on an American marine infected with *Wuchereria bancrofti* in order to find out whether microfilariae would be more readily detected in the blood taken from the stomach of the mosquito than in blood taken from the human subject Earlier workers have reported that the microfilariae are more numerous in the former than in the latter situation The electrohaemometer which measures the amount of haemoglobin per unit volume of blood was used to compare the volume of blood in the mosquito's stomach with the volume of samples taken from the human subject The microfilariae in the blood sample after haemolysis in 1/10 HCl were recovered by centrifuging and counted The number of microfilariae per cc of blood is represented by the formula $\frac{1}{V} \times \frac{R}{r} \times N$ when V is the final

of grammes per
ammes of haemo
om V) and N the

number of microfilariae recovered from V. The number of microfilariae in the blood in the mosquitoes' stomachs was counted after removal of the stomachs and haemolysis of the blood. The *Culex fatigans* and the *Aedes aegypti* used were reared in the laboratory. The former were larger and sucked more blood; the latter were smaller and took less blood, but had more dependable appetites. After removal of the stomach of the mosquito, the head, thorax and abdomen were examined for microfilariae which might have migrated from the stomach.

Calculations showed that the microfilariae were more numerous per unit volume of blood in the stomachs of the mosquitoes than in the blood of the human host. The ratios at each of the three feeds given to the mosquitoes were 7.4 to 1, 9 to 1 and 13.3 to 1 respectively.

The author suggests that this xenodiagnosis method may be useful for the detection of light infestations when colonies of mosquitoes are available.

A further experiment showed that several mosquitoes should be used. Ten specimens of *Aedes aegypti* were fed on the subject and then kept in the refrigerator for 4 days. Two of these had one "worm" each in the thorax, four had one "worm" each in the stomach, one had 6 in the stomach and one in the thorax and three had none at all.

G. Lapage.

DE SARAM, G. S. W. & PIERIS, M. V. P. Filarial Epitrochlear Gland. *J. Path. & Bact.* 1946, July, v. 58, No. 3, 586, 2 figs. on 1 pl.

This is an account of a Ceylonese girl of 14 who suffered from pain, numbness and loss of sensation in the right arm. Various groups of lymph glands were enlarged, particularly the right epitrochlear gland, which was moveable and tender. There was no enlargement of the liver and spleen.

At biopsy, an adult filaria could be seen in section in a dilated lymphatic channel in the gland: numerous microfilariae were lying free in the uterus of the adult. It could not be determined whether the filaria was *W. bancrofti* or *W. malayi*, both of which occur in Ceylon.

The remarkable features of the case are the absence of eosinophilia and of microfilariae in the peripheral blood; the lack of evidence of an allergic response in the affected lymph gland; and the absence of constitutional symptoms, despite the widespread lymphadenopathy.

H. J. O'D. Burke-Gaffney.

SCOTT, J. A. Observations on the Rate of Growth and Maturity of *Litomosoides carinii*, a Filarial Worm of the Cotton Rat. *J. Parasitology.* 1946, Dec., v. 32, No 6, 570-73, 1 fig. [11 refs.]

The author is interested in the development of the filarial worm (*L. carinii*) in cotton rats (*Sigmodon hispidus*). He describes methods of infecting cotton rats by the bite of the blood-sucking mite *Leponyssus bacoti*. The age of worms in the mammal is known to within ten days.

Dissecting rats at intervals and plotting the length of the largest worm in each rat, he concludes that full size (20 mm. in male worms, 80 mm. in females) is reached in some cases as early as 2½ months from infection. Worms are mature before they attain full length, for microfilariae appear in the rodent's blood as early as the fiftieth day, when female worms have attained about half their final length.

P. A. Burton.

SCOTT, J. A. & CROSS, JOY B. A Laboratory Infection of the Rat with Filarial Worms. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 849-55.

YOUNG, W A FARR A G & MCKENDRICK, A J A Report of the Occurrence of Onchocerciasis in Manenge, Tanganyika, and in the Southern Area of Lake Victoria. *East African Med J* 1946 Nov, v 23, No 11, 351-3

SWELLENGREBEL N H & SCHUFFNER, W A P Besmettingsproeven met oxyuris-eieren uit kamerstof [Infection with Oxyuris Eggs from Closet Excrement.] Reprinted from *Nederl Tijdschr v Geneesk* 1946, July 6, v 90 No 27 762-4 1 fig

The original work of LLEUCKART, proving that ingested fresh eggs of Oxyuris are capable of developing directly into mature worms in the intestine without a second host has been frequently confirmed his further statement that the persistence of infection due to egg laying by worms in the caecum ('enteral cycle') was an unnecessary, unproven and unlikely assumption, has not been entirely accepted Swellengrebel and Schuffner here show that egg material, which was obtained from schoolchildren who were 100 per cent infected, and

any daily pestle perianal test was carried out to detect freedom from spontaneous infection The first eggs appeared in 36 to 40 days or in 50 to 53 days and excretion of worms lasted 12 to 27 days A first conclusion from the trials is that dried egg material, ingested or inspired, as distinct from fresh conveyance by hand from anus to mouth, can be infectious, and secondly, that oxyuriasis spontaneously disappears if finger and material infection can be prevented.

W F Harvey

OBER R E Trichinosis. A Review of Cases in Massachusetts from 1936 to 1945. *New England J of Med* 1946, Dec 12 v 235, No 24, 839-42, 1 fig [41 refs]

"Of 287 cases of trichinosis reported in Massachusetts from 1936 to 1945, a total of 70 are reviewed for epidemiologic clinical and laboratory data of significance and compared with the accepted clinical picture of the disease

"The clinical findings most frequently noted were fever, malaise, orbital edema and muscle pains Eosinophilia was the most constant laboratory

PORTWOOD, Lucile M & SANDERS Evelyn Electrophoretic and Allergenic Analyses of Fractions of Larvae of *Trichinella spiralis* *Proc Soc Exper Biol & Med* 1946, June v 62 No 2 165-9 3 figs

The authors compare the electrophoretic and allergenic properties of acid-soluble and heat treated fractions of *Trichinella* larvae with those of the parent

saline extracts of them. An electrophoretic analysis was made in the modified Tiselius apparatus by the moving boundary method (see LONGSWORTH and MACINNES, *Chem. Rev.*, 1939, v, 24, 271).

The allergenic properties were studied in sensitized rabbits and guineapigs. Larvae were obtained by feeding each guineapig with about 5,000 *Trichinella* larvae suspended in 20 per cent. gelatin, the larvae being recovered about 7 weeks later by artificial digestion. For further details of this technique the paper itself must be consulted.

Four to six months before the intradermal tests, rabbits were fed with 20,000 *Trichinella* larvae each. About 18 months before the tests guineapigs were fed with about 5,000 larvae each. Samples of each of the 3 fractions were filtered through fritted-glass filters and tested for sterility. Rabbits were tested with 1:10,000 dilutions, guineapigs with 1:1,000 dilutions, 0.05 ml. of the fractions being injected. The results showed that each of the 3 fractions separated into 3 electrophoretic components "in addition to an incompletely separated portion associated with a heterogeneous mixture. In the primary

represented more than 60 per cent. of acid or heat treatment removed practically all of this mixture. More material was precipitated by heating than by acidification." There was no apparent difference in the area of oedema produced by the primary extract and the acid-soluble fraction, but the heat-treated allergen produced slightly less reaction than the other two. "There is an indication that the allergen is associated with component 1".

For further details and for the authors' discussion of their results, the paper itself must be consulted.

G. Lapage.

OPPENHEIM, J. M., WHIMS, C. B. & FRISCH, A. W. Clinical and Laboratory Observations on 256 Cases of Trichinosis. *Bull. U.S. Army Med. Dept.* 1946, Nov., v. 6, No. 5, 581-93, 1 fig. [26 refs.]

In February and March 1945, trichiniasis was acquired by 256 German prisoners of war in a camp in Michigan. Against Army regulations raw processed pork from regular sources of supply had been served in all but one of the mess halls of the camp. None of in which raw pork was not served contained the infective larvae. the pork was the source of the infection. infestation was a light one and none of the sufferers died.

A table shows the incidence of the main symptoms. It indicates that the commonest symptoms were, in the following order, weakness in 93.7 per cent. of patients, fever in 89.8 per cent., headache in 88.3 per cent., muscle pains in 73.9 per cent., swelling of the eyelids in 70.4 per cent., sweating in 63 per cent., nuchal tenderness in 52.1 per cent. and anorexia in 41.6 per cent. Usually the periorbital oedema was the first symptom to subside, it disappeared before the eighth day of the illness. After 10 to 16 days headache and muscle pains were unusual or absent. Fever was variable, exceeding 104°F. in 8 persons, but not exceeding 99°F. in five; after the 14th day it had subsided. Weakness and malaise did not disappear until the third week. Hypertension was not observed and lymphadenopathy was too infrequent to be significant.

There was an inverse relationship of the percentage of eosinophils to the clinical severity of the disease. The authors describe three of their patients which illustrate this point. One of these was acutely ill with 8 per cent. of eosinophils on admission to hospital and 34 per cent. on the tenth day, when there had been considerable improvement. Another case was similar. The third patient had only mild symptoms, but had 67 per cent. of eosinophils on admission. A similar phenomenon has been recorded by BARTLETT (Iale.

The authors consider thiamin deficiency to be the sole cause of the syndrome and their findings provide strong evidence in favour of this and justification for the title which they have chosen.

The cases were observed in Roberts Hospital, Changi Prisoner-of-War Camp, Singapore, during 1942.

The evidence leading to the attribution of all the cases to pure vitamin B₁ deficiency was briefly—

(1) Coincidence in time of the main wave of encephalopathy with a period when the B₁-non-fat-calorie ratio was lowest, 0.2; (2) Its coincidence with a high incidence of other forms of beriberi, at a time when no other deficiency diseases were prevalent; (3) the coexistence of other manifestations of beriberi in 79 per cent. of individual cases, and (4) the rapidity and completeness of cure with parenteral injections of thiamin, even in the very small doses, up to 9 mgm., that were available. 37 patients received thiamin injections and 25 were cured, in 9 of the 11 who died in spite of injections there was a major complicating factor. Among 15 patients who received no B₁ injections, 10 died and 5 mild cases recovered slowly on dietary measures alone.

[If, as these observations so strongly suggest, Wernicke's encephalopathy is due only to Vitamin B₁ deficiency, there remains to be explained the apparent immunity of many Asiatic peoples among whom other forms of beriberi are endemic. It may be, as de Waedener and Lennox suggest, that the cerebral syndrome is only produced by severe, acute deficiency, whereas the common neuritic, oedematous and cardiac manifestations arise in response to a prolonged but milder vitamin lack and that the former is relatively uncommon among eastern populations.]

There was, in almost all this series of cases, a predisposing condition interfering with vitamin intake and intestinal biosynthesis and producing a severe acute deficiency: a history of prolonged diarrhoea, with more than three weeks on a fluid diet, mainly water, was obtained in 45 of the 52 cases.

Clinical appearances were characteristic. Anorexia, following a period of diarrhoea, was usually the first symptom. This was followed in about a week by nausea, vomiting, disorders of visual perception and nystagmus, which was a constant finding. Mental apathy and emotional change, with insomnia, gave place, as the disease progressed, to amnesia with deepening disorientation and semi-coma. In untreated cases there was a terminal phase of coma and oculomotor palsies.

There were no facilities for histological examination of post-mortem material but typical naked-eye haemorrhages of the corpora mamillaria were seen in 8 brains examined fresh. The C.S.F. was normal in all cases examined.

Intramuscular injection of thiamin produced improvement usually within 12 hours and apparently complete physical cure in a few days; but return of mentality to normal was slower, taking up to three months in severe cases.

Dean A. Smith.

DOUCET, G. Le "Mbuaki" ou maladie de carence observée au Kwango. ["Mbuaki", a Deficiency Disease seen in Kwango.] *Rec. Travaux Sci. Méd. Congo Belge*. 1946, May, No. 5, 261-73. {25 refs.}

The disease called "Mbuaki" in the Lukala region of the Belgian Congo appears to be identical with that described by PIERAERTS [this *Bulletin*, 1942, v. 39, 99; 1943, v. 40, 406; 1947, v. 44, 225] under the name of diboba, and to be similar to kwashiorkor or infantile pellagra. Mbuaki is a seasonal disease, becoming epidemic towards the end of the dry weather. The incidence is $\frac{1}{2}$ -1 per cent. of the population. Men are occasionally affected, but the main incidence is among infants, children, and pregnant or nursing women.

The date of the T. D. B. is only a guide to the date of the publication of the paper.

J C Waterlou

BANERJEE S & GHOSH N C Adrenalin in Scurvy *J Biol Chem* 1946
Nov 1 166 No 1 25-9 2 figs

1 The effect of scurvy on the adrenalin content of the adrenals of guinea pigs was studied by a paired feeding technique

2 There was significant increase in the size and also in the adrenal content of the adrenals of scorbutic guinea pigs

3 The glucose tolerance tests were performed on scorbutic guinea pigs with demedullated adrenals on demedullated guinea pigs receiving vitamin C and on guinea pigs with intact adrenals receiving vitamin C

4 The demedullated scorbutic guinea pigs gave a diabetic type of glucose

SPRUE

MILANES F CURBELO A RODRIGUEZ A KOURI P & SPIES T D A Note on Bacteriological and Parasitic Studies of the Intestinal Contents of Patients with Sprue *Gastroenterology* 1946 Sept 1 7 No 3 306-11 fig [10 refs]

Whilst studying the response of persons with tropical sprue to synthetic folic acid it was observed that although many had intestinal parasites they responded clinically and haematologically to folic acid even in the absence of anti-parasitic therapy. The present paper is restricted to the bacteriologic study of the stools of twenty five patients with tropical sprue and to the

cultures were also made. Intestinal parasitic ova, cysts or adult forms were present in the faeces of 56 per cent. and in the contents of the small intestine in 12 per cent. Bacterial culture revealed a multiplicity of organisms—mostly of the normal intestinal flora. In 72 per cent. of cases, a Gram-positive non-sporulating, anaerobic bacillus—*Butyrubacterium*—was observed, whilst growths of yeasts occurred in the faeces in 40 per cent.

All patients improved clinically and haematologically on 10 mgm. of folic acid in daily oral doses over a period of 45 days. Their glossitis disappeared, then appetite improved, they gained weight and experienced a feeling of well-being.

The profound change in the stools after treatment in comparison with those before treatment is remarked upon, but *pari passu* the incidence of parasites, bacteria and yeasts remained essentially unchanged in the faeces of the large and small intestines.

These parasites were *Ascaris*, *Trichuris*, *Necator*, the commoner non-pathogenic amoebae, *Giardia* and *Chilomastix*.
P. Manson-Bahr.

DREW, R., DIXON, K. & SAMUEL, E. Residual Defects after Sprue. A Review of 26 Cases. *Lancet*. 1947, Jan. 25, 129-34, 10 figs. [17 refs.]

This paper has been written to discuss those cases in which the sprue process persists and a method of detecting those convalescent patients likely to relapse. An endeavour was also made to find out whether radiological and biochemical abnormalities persisted and what was their relation to the degree of clinical activity of sprue.

As previous biochemical estimation of absorptive powers of the bowel lack radiological control, they are of doubtful value, since it is uncertain whether the test meals reach the absorbing surfaces of the small intestine or are held up in the stomach, an occurrence which is a feature of sprue.

The authors have used largely radiologically-controlled intestinal intubation for giving test-meals in order to estimate the absorptive power of the bowel: a method which has proved of great value in studying its pattern and motility.

The work is therefore a combination of clinical, radiological and biochemical examination of convalescent sprue patients, and of normal healthy controls.

Among the 26 patients, 25 had returned from South East India and 1 from North Africa (an unusual sprue area). In 2 patients, symptoms developed after their return to England.

With one exception, they were treated with sprue diet and parenteral liver. At this stage all showed a high total faecal-fat content

On clinical and haematological criteria, 12 were considered to have completely recovered, 9 showed mild, 4 moderate and 1 severe signs of sprue.

Biochemical observations.—Fluid meals containing butter-fat, glucose and barium sulphate were introduced by Miller-Abbott tube into the small intestine of the fasting subject. Thereafter the position of the meal and its progress in the bowel were checked by radiography.

The site of the tube in the bowel was determined by careful screening and by a special technique. Delivery of the meal to any required portion of the small intestine could be assured and thus ensured that lack of absorption could not be ascribed to delay in gastric motility or to inefficient pyloric relaxation.

Three types of test meals were employed:—

Meal 1: butter 75 gm., glucose 50 gm., barium sulphate 100 gm. and water 150 ml. The ingredients were made into an emulsion, warmed to body temperature.

Meal 2 butter 31 gm toast 2 oz milk 2 oz and a cup of tea were given by the mouth and followed in four hours by meal 3

Meal 3 glucose 50 gm glycine 25 gm barium sulphate 50 gm and water 100 ml given by mouth four hours after meal 2

Test meals were given after an overnight fast. On the meal morning venous and capillary blood samples were taken the latter at half hour intervals up to four hours after the meal. Special attention was paid to correlation between the serum lipid fractions and the number of particles (chylomicrons) seen with dark ground illumination. Increase in serum opalescence was of equal value to the chylomicron count as a criterion of lipid absorption.

Total fatty acid was determined after saponification of an alcohol-ether extract of serum by a titrimetric method developed in the laboratory. By this method (for the details of which the paper must be consulted in original) serum 2 ml sufficed for estimation of all the lipid fractions.

Lipid phosphorus was estimated after incineration of a 10 ml sample of the serum in hot sulphuric acid.

Phospholipid was obtained by subtracting the phospholipid from the sum of the total fatty acid added to the meal. It was 18 per cent of the phospholipid in multi-equivalents.

Neutral fat was evaluated as glyceryl trioleate corresponding to non-phospholipid fatty acid.

Neutral fat was determined colorimetrically on an aliquot of the serum.

These observations agreed with the chylomicron counts.

Blood sugar was estimated every half hour in capillary specimens.

Amino-acid nitrogen was estimated only after meals containing glycine.

Absorption of meals—Those introduced into the jejunum were followed by

fat absorption appeared to depend on the extent of regurgitation into the second part of the duodenum.

Meals taken by mouth were followed by fat absorption but this was delayed if large amounts of fat were included and even when a light fatty meal was given fat absorption was sometimes delayed. Meals by mouth were used chiefly for studying amino-acid absorption.

Absorption of fat—Results with meals introduced into the first and second parts of the duodenum are considered in this respect.

They were followed by increase in neutral fat particle counts and opalescence of the serum.

The figures for neutral fat calculated from the values for non-phospholipid fatty acid show that this is the only serum lipid which shows constant increase accompanying fat absorption.

No significant alterations in lipoid phosphorus and cholesterol were observed, and the increases in particle counts and serum opalescence thus accompany increase in neutral fat and afford convenient indications of fat-absorption.

Ten (of the 14) content after fatty test-r micron counts were obse blood-fat was observed and in two neither visible lipaemia nor increase in chylomicron counts were observed, although fat-absorption was deranged. Thus deficiency of fat-absorption was not detected in most patients.

Absorption of glucose.—In general, the blood-sugar level rose abruptly and was followed by a sharp fall. Absorption was rapid and seen to follow equally meals introduced into the duodenum and into the jejunum. Occasionally a flattened type of blood-sugar curve was obtained, even in normal subjects.

Absorption of amino-acids.—The glycine was generally given as a separate test-meal by mouth (meal 3) four hours after the small fatty-meal (meal 2), also given by the mouth. In all 4 patients investigated satisfactory absorption of amino-acids was observed, as in normal controls.

Radiological appearances.—The technical difficulties of passing a Miller-Abbot tube were overcome by introducing 1-2 cc. of metallic mercury into the balloon of the tube, with the subject lying on his right side, negotiation of the tube through the pylorus was thus assisted.

A large fatty meal introduced into the normal small bowel did not produce to those seen in sprue. This appears to invali- (American J. Roentgenol, 1939, v. 41, 758) 43, v. 40, 259] that the radiological changes in sprue are secondary to the abnormal fatty contents in the small intestine.

A large fatty meal introduced directly into the small bowel did not lead to slow sluggish passage as in established sprue, but the rate of transit appeared to be increased. The mucosal pattern in the jejunum was coarser than normal, suggesting that these changes are secondary to reflex stimulation.

The radiological appearances of the small bowel have been the subject of considerable attention in recent years and it has been proved by GOLDEN (*Radiology*, 1941, v. 36, 262) that the appearances, though characteristic, are not specific for sprue.

By their special method the authors record four types of changes in sprue :—

Changes in Motility.—In the early stages the meal passes through the small bowel more quickly, but in a well-developed case delay is the outstanding feature. When given by the mouth there is gastric retention of the meal. The unchanging appearance in the small bowel wall merits the term "moulage pattern" bestowed upon it.

Changes in Tonicity.—Areas of hypertonicity (segmentation) alternate with areas of hypotonicity (dilatation). These changes are most obvious in the middle third of the ileum. The terminal ileum is not involved to the same degree.

The tonicity of the muscularis mucosae is greater in the early stages of sprue and may be responsible for exaggeration of the jejunal pattern. Later, hypotonicity is partly responsible for the flattening, thinning, and loss of haustral markings.

Pattern changes in the mucosa are most clearly seen in the mid-third of the small bowel and are best demonstrated by spot-mucosal relief pictures after barium-sulphate solution has been delivered through a Miller-Abbott tube.

The normal feathery mucosal pattern is replaced by a coarse irregular pattern. The valvulae conniventes are widened, coarser and further apart.

They also cease to have the fine delicate appearance and are very irregular in outline.

VENOMS AND ANTIVENENES

LEESON F Snake Species recorded in the Gold Coast *Ann Trop Med & Parasit* 1946 Dec v 40 Nos 3/4 325-9

BONSMANN M R Zur Frage der Wirksamkeit von Schlangengiften bei innerlicher Darreichung [The Action of Snake Venoms administered Internally] *Arch f Exper Path u Pharm* 1942/43 v 200 167-75 [Refs in footnotes]

BONSMANN M R Ueber die Verwendbarkeit von tropischen Pflanzenauszügen gegen Schlangenbisse [The Effect of Tropical Plant Extracts against Snake Bite] *Arch f Exper Path u Pharm* 1942/43 v 200 414-18 [27 refs]

SOLIMAN H S & MOHAMED A H Effective Agent against Scorpions [Correspondence] *Lancet* 1947 Jan 11 83

Scorpions exposed to 1-4 gm of powder containing only 1 per cent Gammexane in talc are paralysed within 30 to 60 minutes

DE ORO G A Dermatitis Venenata resulting from Contact with Marine Animals (Hydroids) Report of Cases *Arch Dermat & Syph* 1946 Dec v 54 No 6 637-49 9 figs

DERMATOLOGY AND FUNGUS DISEASES

BENEDEK T with the collaboration of I LEWE H PRICE & A KORANSKY and with the technical assistance of Flora VAN HORN Pompholyx (Epidermophytosis, Dermatophytosis, Ringworm of the Feet, Infectious Eczematoid Dermatitis or Ringworm, Dysidrosis) A Statistical Contribution to the Solution of the Pending Problems *Mycopathologia* The Hague 1943 Aug 30 v 3 Nos 3/4 240-54 [Numerous refs]

This paper commences with an interesting though dogmatic discussion on points of historical interest The authors castigate Talbury FOX (*Amer J*

that the word is as meaningless as
ery alternate page of their article

ANN WOLFF (*Dermat Ztschr* 1914
v 21) and many subsequent authorities were heretical (in the medical sense) in
further the theory
exogenous bacterial
p on a long series of

fallacies

The authors survey the literature of the subject and turning from pompholyx they suggest that hyphomycetes do not play any causative rôle in the group of epidermophytosis They then describe an investigation of 983 persons 41 per cent of whom were negroes Pompholyx of the feet only was found in 18 instances and only in white persons Somewhat surprisingly in making a clinical diagnosis they considered the slightest scaling

between the toes as evidence of the malady—a criterion with which few authorities would agree. On microscopic examination, fungi were not found in the lesions, but on cultures certain moulds, yeasts and bacteria were grown but these were not classified as “pathogens”.

Having satisfied themselves that pompholyx was not due to fungous infections they admitted all the persons with clinically positive signs of pompholyx (“epidermophytosis”) without any restriction to the camping season. “We discarded all the usual proscriptions in the camp. Children and grownups ran barefooted on the fat grass of the camping ground as much as they liked. They used the same locker rooms, the same runways, shower rooms, etc., altogether.

“We discouraged ‘prophylaxis’ directed toward attempts to kill the ‘fungi’ or to prevent their ‘dissemination’. We discarded the farcial (*sic*) ritual of ‘foot-bath’ containing 1 per cent. sodium hypochlorite recommended from different quarters for use in locker rooms or before leaving the swimming pool runway in order to prevent dissemination.

“And the result? There was no increase of incidence in ‘epidermophytosis’, no spread, no dissemination and no outburst of an epidemic. And all that in a camp where nearly a “turnover” of persons turns in groups every ten days in mid-summer.”

[This paper is scarcely one to show a considerable difference of opinion between the authors and most dermatologists as to the signs of fungous infection and the signs of pompholyx. Nevertheless, most of us will agree with the main contention, that in the majority of cases pompholyx is not due to fungous infections of the skin.

This paper comes, in part, from the Salvation Army Free Dispensary, and it is interesting, therefore, to find that the authors have revived the art of polemics in medical literature.]

R. M. B. MacKenna.

ALFONSO ARMENTEROS, J. Tratamiento local de las tiñas del cuero cabelludo. (Segunda nota.) [Local Treatment of *Tinea capitis*.] *Rev. Sifilografía, Leprología y Dermatología*. Marianao, Cuba. 1946, July, v. 3, No. 3, 133-6.

Local applications, it is claimed, have the advantage over such methods as depilation, by X-rays or the use of thallium salts. For comparison the author has divided his ten cases into two groups: one he treated by painting with a preparation containing salicylic acid 10 gm., gentian violet 2 gm., alcohol 100 cc.; the other by an ointment containing salicylic and benzoic acids each 5 gm. in 25 gm. each of codliver oil and lanoline. Whichever was used, application was made twice daily after soaping applied with a tooth-brush, rinsing in running water and vigorous rubbing with cotton-wool soaked in alcohol. Four of the five patients treated with the paint were cured in 2-3 months (this includes the time for growth of hair over the area treated; the lesions were free of scales and diseased hairs in 15-20 days). In the fifth case the diseased hairs were still visible after 30 days' treatment; this patient was cured by subsequent application of the ointment. All those treated from the first with the ointment made a good recovery, the scales, crusts and diseased hairs disappeared in 15-27 days. In some who used the paint there was abundant scale and crust formation, which impeded the action of the medicament. For such patients both preparations were used, one in the morning, the other in the evening. Diseased hairs were not plucked out in the usual way with forceps because the soaping and subsequent friction effectually got rid of them.

H. Harold Scott.

loss. There was a good linear relation between evaporative loss on the one hand and solar intensity, dry bulb temperature and rate of heat production of the walking man on the other.

In sitting subjects clothing reduced evaporative loss by about 100 grammes per hour but when evaporative loss was compared with rates of oxygen consumption there was no significant difference between clothed and nude subjects walking in the sun. It was calculated that 72 per cent of the heat produced by working was lost by evaporation of sweat in tropical sunshine. In the desert all the heat due to working was lost by evaporation.

While persons were exposed for 1 to 2 hours to varying conditions (80° to 104° F) in a series of about 100 tests heat exchanges were calculated. All the results showed that although many subjects were actually gaining heat from the environment by radiation and convection the loss by evaporation was sufficient to keep the body temperature practically constant. At air temperatures greater than 90° F clothing reduced the heat gain by 75 to 150

MISCELLANEOUS DISEASES

GELFAND M. Jaundice in Acute and Severe Infections in the African. *J Trop Med & Hyg* 1947 Jan. v 50 No 1 15-18 [11 refs.]

ANNING S. T. The Aetiology of Desert Sore. *Trans Roy Soc Trop Med & Hyg* 1946 Dec. v 40 No 3 313-30 [33 refs.]

[This is a stimulating article and will doubtless lead to further research.] The author has studied 63 cases of desert sore in Northern Iraq and presents the results of his personal investigations and reading of the literature. The condition—if it be a single pathological condition—has a wide geographical distribution having been reported from South and East Africa, Libya, Egypt, Palestine, India, Syria, Iraq, Iran, Australia and elsewhere. Aetiological factors which have been named, would it not be more correct to say, have been 'suggested or guessed at' are many: contact with animals, insect bites, contagion, avitaminosis, diphtheria, exposure to the sun's rays. Occupation plays a part only in so far as it entails risk of trauma for the primary lesion seems to be nearly always some small wound, abrasion, insect bite or the like which does not heal in the usual way but becomes indolent and perhaps surrounded by satellite vesicles or pustules. They always seem to appear on exposed parts. After rupture of the pustules ulcers form and later crusts and on healing thin papery scars are left which may again break down especially if healing leads to itching and consequent scratching. The general health is in most cases not at all affected and lymphadenitis is unusual. The bacteriology is very varied as would be expected if the failure to heal is due to secondary contamination.

Fifty-one cases in the author's series were studied bacteriologically and the commonest organisms were streptococci in 30, next *Staphylococcus albus* in 19, *Staph aureus* in 17, unspecified staphylococci in 14 and Gram positive diplococci in a like number. *C. diphtheriae* was found in one only. Syphilis plays no part. Variations in the blood count were negligible, a few showed a moderate leucocytosis but the majority were within normal limits as regards

GENERAL PROTOZOOLOGY

TALIAFERRO W H Populations of Blood-Dwelling Species Reprinted from
Amer Naturalist 1941 Sept-Oct v 75 458-72 7 figs [18 refs]

This short review of some of the
 the parasite and its
 work by various in
 the last twenty year
 abstracted in the

probably remove only the dead and dying plasmodia which have been acquired from the host

as the immunity develops the macrophages
 as the host passages

In the case of *T. lewisi* in the rat an inhibiting antibody, named *ablactin* [this *Bulletin* 1924 v 21 423] and trypanocidal antibodies are a since multiplication is inhibited

Reference is made to the mathematical treatment of the subject of infections in whole host communities by ROSS and by LORCA [this *Bulletin* 1923 v 20 298]
 J F Corson

GENERAL ENTOMOLOGY

U C C GHOSH S M MCCLYMONT A G & ROY D N A Preliminary Report on some Laboratory and Field Experiments to determine the relative Effectiveness of Pyrethrum, DDT and Gammexane D919 as Insecticides and Larvicides *J Malaria Inst of India* 1946 June v 6 No 3 985-95

Comparisons of the insecticidal properties of pyrethrins (1 per cent concentrate) DDT (2 commercial) and crude Gammexane [probably 13 per cent purity] were made with powder and kerosene dilutions The following conclusions can be drawn from the experiments —

(1) The
 (2) The
 (3) The

(1 to 5 per cent.) the pyrethrins were more toxic. DDT was not only less toxic but considerably less rapid in action.

The crude gammexane was most toxic to anopheline and culicine mosquito larvae in laboratory tests when applied as a powder.

(2) Tests with kerosene solutions.

[The method of preparing the gammexane solution is a little suspect; it would favour a high gamma content.] Spray experiments against houseflies, mosquitoes and sandflies (*Phlebotomus*) were conducted in a modified Peet Grady chamber. 5 per cent. DDT and

knockdown in ten minutes was only complete throughout with pyrethrum. The DDT and gammexane gave a poor knockdown of *Musca* spp. and *Armigeres obturans*.

Kerosene solutions used as a mosquito larvicide in the field were effective as follows:—

1 per cent. pyrethrins :	3-6 days (in open), 9-13 (in shade)
5 " DDT :	5-8 " 14-20 "
5 " Crude Gammexane :	3-9 days (in open), 12-16 (in shade)

A residual spraying of a small dummy mattress with 5 per cent. DDT or crude Gammexane had a good residual effect against bed bugs for fifty days in both cases.

DDT and Gammexane sprays were effective against head lice but not against their eggs.

J. R. Busvine.

YATES, W. W. Time required for *Aedes vexans* and *A. lateralis* Larvae to obtain a Lethal Dose of several Larvicides. *J. Econom. Entom.* 1946, Aug., v. 39, No. 4, 468-71, 1 fig.

Experiments were done with larvae which hatched in the laboratory from eggs collected in the field. Lots of twenty-five larvae were exposed to the insecticides for different periods ($\frac{1}{2}$ to 4 hr.) in small dishes containing tap water. Afterwards they were transferred to clean water for recovery. Various DDT preparations were compared with standard insecticides.

The following are approximate percentage kills forty-eight hours after a two-hour exposure.—

Pyrethrum emulsion (2 gall. per acre) ...	100 per cent.
3 per cent. oil emulsion (2 " ") ..	95 "
Diesel oil (2.5 " ") ...	90 "
Phenothiazine in solution (1 p.p.m.) ...	79 "
5 per cent. Paris Green dust (2 lb. per acre) ...	96 "
0.1 per cent DDT dust (0.2 lb DDT per acre) ...	7 "
0.025 per cent. DDT suspension (0.2 lb. DDT per acre) ..	86 "
0.05 " DDT emulsion (" " ") ...	84 "
0.1 " DDT in diesel oil (" " ") ..	85 "

It will be observed that the only notably inefficient DDT preparation was the DDT dust (diluted with talc from a 10 per cent. commercial dust). The other preparations of DDT were slightly slower in producing an effect but the kills were comparable with heavy doses of orthodox larvicides.

J. R. Busvine.

Aziz, M. A. A Simple Device for the Application of DDT Larvicide. [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1946, Dec., v. 40, No 3, 353-4.

An adaptation of an ordinary flit-gun by extending the tubing and piston handle to about 3 feet

MADDEN A H LINDQUIST A W & KNIPLING E F DDT applied from the
Ground for Control of Mosquitoes *J Econom Entom* 1946 Aug v 39
No 4 463-7

Applications of insecticidal solutions were made by men walking across jungle areas in Florida infested with *Aedes taeniorhynchus* and *A. sollicitans*. The sprayers used were (a) a capillary tube sprayer which gave a consistently fine spray mist (particles about 18μ average diameter) (b) a paint spray gun which gave fine particles (18μ diameter) at first but as the air pressure declined gave more and more coarse droplets and (c) a mechanical sprayer (0.5 inch jet and 136μ particles). The insecticide used was mainly DDT in kerosene or No 2 fuel oil. Solutions of 5-20 per cent were used to give dosages of 6 gm DDT per acre. The results of spraying were estimated by the numbers of mosquitoes coming to bite observers in one minute intervals before and one hour after treatment.

Results showed that the effectiveness of the sprayers were in the order

apparatus for applications of this kind. The kerosene or fuel oil alone had a considerable effect even without DDT when used at the rate of 125 cc per acre or more.

Gammexane applied at 0.75 gm per acre was rather less effective than DDT at 6.25 gm per acre in a single experiment.

J R Bustine

ELMENDORF J E Jr MARUCCI P E GRIFFIN J B MEYER S L & RYAN
contacting Screen
fed 1946 Sept

Wire mesh (18 to the inch) was treated with DDT in various solvents at different rates (50, 100 and 200 mgm per sq foot) the applications being made with cotton swabs. The lethal effects of the deposits on the mosquitoes

It was found that solvents such as acetone and kerosene which dried within a few hours and left crystalline DDT were of comparatively low toxicity. Several minutes contact were required to give a complete kill twenty four hours later. With non volatile solvents Dieselene mineral oil and SAE # 30 and SAE # 50 [American Army issue oils] four instantaneous contacts were able to produce complete kill at first and after weathering for some fifty days about a minute's contact was required. These deposits could be revitalized by spraying with solvent alone.

Loss of toxicity was considerably greater if the wire was weathered outdoors instead of indoors and the deposit was more difficult to revitalize.

J R Bustine

CRISTOL S J HALLER H L & LINDQUIST A W Toxicity of DDT Isomers
to some Insects affecting Man *Science* 1946 Oct 11 343-4

As compared with p,p'-DDT, the o,o'-DDT isomer was found to be of very low toxicity to adults and fourth stage larvae of the mosquito *A. quadrimaculatus* and to the housefly and the body louse.

Although the o,p' isomer was ineffective against the adult mosquito and the housefly, it was fairly effective against the mosquito larvae. J. R. Busvine.

ODUM, E. P. & SUMERFORD, W. T. Comparative Toxicity of DDT and Four Analogues to Goldfish, Gambusia, and Culex Larvae. *Science*. 1946, Nov. 22, 480-82, 1 fig.

JONES, H. A., TITUS, H. A. & OBERG, M. W. DDT Emulsion Concentrates. *Soap*. New York. 1946, Dec., v. 22, No. 12, 155, 157, 165

GERSDORFF, W. A. & BARTHEL, W. F. Determination of Pyrethrins Deterioration. *Soap*. New York. 1946, Oct., v. 22, No. 10, 155, 157.

Samples of pyrethrins were kept under different conditions for 170 days and then tested for their toxicity to houseflies by the turntable method. It was found that none of the samples lost their power if stored in the dark at 2°C. but at room temperature in diffuse light, or at 40°C. in the dark, there were very great losses of toxicity with 100 per cent. pyrethrin concentrate and fair losses in a 20 per cent. commercial concentrate. These losses were inhibited by addition of hydroquinone (0.1 per cent.) or by dilution with odourless kerosene.

Concomitant with loss of toxicity was the development of sludgy material insoluble in dichloro-difluor-methane (Freon) and the presence of matter insoluble in Freon is a good guide to loss of toxicity. J. R. Busvine.

JONES, H. A., MCCOLLOUGH, G. T. & MORTON, F. A. Effect of Storage on Insect Repellents. *Soap*. New York. 1946, Oct., v. 22, No. 10, 151, 153.

Samples of the two repellents known as 6-2-2 (60 per cent. dimethyl phthalate 20 per cent. "Rutgers 612", 20 per cent. "Indalone") and 80-20 (80 per cent. dimethyl phthalate, 20 per cent. "Rutgers 612") were stored in different containers under various conditions of temperature and light. After eight months their repellent values were tested against *Aedes aegypti* and *Anopheles quadrimaculatus* and compared with freshly prepared mixtures of the same materials, each pair of tests being performed on the arms of one subject. The results are shown in a table.

The only decrease in repellency (accompanied by a tendency to become opaque) was shown by the 6-2-2 mixture stored in metal cans at room temperature and at 60°C. No loss in repellency was shown by 6-2-2 stored at 60°C., or in sunlight in amber bottles or in pyrex flasks. The 80-20 mixture appeared to be little affected, though a loss in value was shown by a sample stored in pyrex flasks at 60°C., but this was possibly due to contamination from the rubber stopper or some other source. H. S. Leeson.

BLOCK, S. S. Insect Tests of Wire Screening Effectiveness. *Amer. J. Pub. Health*. 1946, Nov., v. 36, No. 11, 1279-86, 4 figs.

———. Tests of Screening Effectiveness against Insects. *Science*. 1946, Nov. 8, 447.

The second paper is a summarized version of the first.

While testing the efficiency of screening of the following mesh sizes: 18×18, 16×16, 14×14, 18×16, 18×14, and 18×12, the special object of the investigation was to compare the efficiency of rectangular with the usual square mesh openings, especially screening having 18 warp (length) wires and 14 filler

LABORATORY PROCEDURES

BAROODY B J Modification of the Faust Method in the Detection of Cysts and Ova. *J Lab & Clin Med* 1946 Dec \ 31 No 12 1372-4

In 1945 the author had occasion to examine ever increasing numbers of troops arriving from the Pacific theatre of operations and suffering from amoebiasis. In his experience the Faust zinc sulphate flotation method had proved most satisfactory for the detection of amoebic cysts nevertheless in many cases even with this method persistent negative results were found

The modified method consisted essentially of the following steps —

1 Ten gm of faeces are placed in a 125 cc stoppered Erlenmeyer flask containing about 75 cc of warm water (about 40°C) and shaken until emulsified (the particles). Centrifugation and washing are repeated once more and the supernatant fluid is finally discarded

3 About 10 cc of warm water are added and the sediment agitated by shaking after which all the contents are poured quickly into a 15 cc centrifuge tube and centrifuged for 1 minute at 2 500 r p m. The supernatant is decanted

float to the surface

This technique differs from Faust's original method in three particular respects —

the use of a 15 cc centrifuge tube which is added thus obscuring the eventual microscopical preparation

(3) The initial use of a 50 cc centrifuge tube provides for receiving a large

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

KAUNTZE W H The Occurrence and Control of Transmissible Diseases in British Colonial Territories from the Outbreak of the Recent War to December 1945 *Bull Office Internat d Hyg Publique* 1946 Apr May-June \ 38 Nos 4 5 & 6 281-6

Dr KAUNTZE discusses this problem under three main heads (1) general epidemiological control arrangements (2) research and (3) communicable diseases 1939 to 1945

Under the first heading he outlines the temporary arrangements which became necessary, owing to the interruption by war of relations with the *Office International d'Hygiène Publique*, to maintain the exchange of epidemiological information and the co-ordination of control measures within the Colonia Empire and in relation to foreign territories.

Reference is made to the suspension by the Egyptian Government in 1941 of the Regional Bureau at Alexandria, and its temporary replacement by an exchange service, with the Quarantine Directorate in Alexandria as a centre to the International Sanitary Convention and that for Aerial Navigation, in 1944, and the assumption by UNRRA of the rôle of the *Office International d'Hygiène Publique* as a centre for the collection of Colonial epidemiological information; to the establishment in 1941 of the Inter-Departmental Committee on Yellow Fever Control; and to the Trinidad Conference in 1943, which considered the formation of a model Quarantine Ordinance for adoption by the British West Indian Governments in order to co-ordinate quarantine procedure.

Operational and transport problems met with by His Majesty's Forces called forth much investigation relating to the control of infectious diseases, and valuable knowledge was obtained. The research measures inaugurated are discussed under the second heading.

The Colonial Medical Research Committee was re-established in 1945, and since then a Malaria Sub-Committee has been set up, to consider co-ordination of malaria research in the British African Colonies. A similar Committee, concerned with Tsetse and Trypanosomiasis research and control was established in 1944.

The specific investigations carried out during the period under review are outlined, the principal work being: (1) the mosquito research by the British Guiana Malaria Research Service, which incriminated *A. darlingi* as the only carrier species of practical importance and which showed that control measures with insecticides like DDT may solve the malaria and filaria problems in that territory; (2) Dr. BLACKLOCK's investigations into the high rate of malaria incidence in passengers and crews of ships arriving from West Africa, and the improvements obtained in Freetown as a result of his recommendations; (3) Dr. Muirhead THOMPSON's studies of *A. gambiae* in West Africa; (4) Mr. SYMES' extensive inspections of, and recommendations regarding yellow fever control in aerodromes along the main air routes in Africa, and his field researches, with a special team in East Africa, into the use of various insecticides; and (5) Dr. LEWTHWAITE's enquiry into scrub typhus in the Far Eastern theatre, which resulted in his recommendation of the use of dibutyl-phthalate as a mite-repellent, the employment of the "Fulton" cotton-rat vaccine, and the establishment of a Scrub Typhus Research Laboratory.

Under the final heading Dr. Kauntze discusses the incidence of six prominent infectious diseases in the Colonies, and points out that despite the large movements of men all over the world and the increased rapidity of air travel, no serious pandemic of one of the formidable epidemic diseases occurred in British Colonial Territory during the period under review—a striking tribute to the efficiency of . . .

Yellow F . . . e
need for it . . .
Egyptian S . . . h

Institute in Entebbe. An Inter-Departmental Committee was set up in 1941, and representation included Service and Civil Departments, and the Governments of the Union of South Africa and Southern Rhodesia.

Sporadic outbreaks of yellow fever occurred in a number of places in the West African Colonies, and the first cases in East Africa consisted of one each from Uganda in 1941 and Kenya in 1942. Mass inoculations were undertaken.

The toxic effects recorded were vomiting in 12 of the treated and in only three of the controls a shock like state in five of the treated and kidney damage manifested by uraemia and post mortem findings in at least three cases this damage was believed to have been caused or aggravated by the drug

The clinical features of the disease were closely studied both in the treated and control cases From an analysis of the findings in 50 representative untreated patients the following list has been prepared the figures refer to percentage incidence The fever was remittent in 32 continued in 26 continued at first and later remittent in 18 and irregular in 20 Tachycardia occurred in 90 increased respiration rate in 80 obvious dehydration at some time in 58 flushed face in 52 conjunctival injection in 54 a macular or haemorrhagic rash in 94 gland enlargement in 50 bronchitis or bronchiolitis in 58 low blood pressure mental symptoms in 68 in 100 and in males in 50

Rickettsiae were isolated from 17 of the 19 patients from whom samples of blood were taken for animal inoculation altogether 22 such samples were taken and the usual procedure was to inject 5.0 cc. of whole blood intraperitoneally into a guinea pig The strains used for transfer to mouse lungs in the form of guinea pig brain suspensions were taken at the 4th to the 6th guinea pig passage all the 11 strains employed were found to be well adapted for initiating a series of lung passages

Repeated serological tests were carried out in 59 cases in which the date of onset was known Curves are reproduced to show the rise in titre observed

Pr. O12 and murine rickettsiae were also agglutinated at rising titres but the levels reached were much lower

intage of showing diagnostic the antigens employed were ee the part of this abstract dealing with chapter 4) A tendency to zoning had to be guarded against by using a large series of dilutions

A slide-agglutination test in which methylene blue stained *Proteus O19* was used is described as useful and convenient

Complement fixation tests in which fresh Fulton and Begg antigens were used gave highly specific responses with epidemic and murine sera After storage the antigens yielded higher but less specific titres

The blood changes among the patients of the treated and control groups were closely studied no significant differences were observed between the two No striking or characteristic changes were found in the blood-cell counts the leucocyte counts showed a wide range of variation but on the average they were lower than normal

The blood urea was raised in most of the severe attacks in 13 out of 18 grave cases the level rose above 100 mgm per 100 cc. and 10 of the 13

output was usually slight urea clearance was often but not always greatly reduced in the severest cases

The post-mortem findings are described in detail and are illustrated by 24 good reproductions of photomicrographs. Special emphasis is laid on the severity of the lesions sometimes observed in the heart and kidneys. The conjunctiva is said to be the most reliable tissue for use in detecting the vascular lesions. Proliferative changes in the small arterioles were more striking than necroses.

In the 3rd chapter, VAN DEN ENDE and MILLS describe experiments which they regard as showing that the pulmonary titration method of estimating potency of antirickettsial sera may be helpful in testing vaccines and antisera. The method is based on the observation that when mice are inoculated intranasally with rickettsial suspensions the number of focal lesions produced in the lungs is reduced when antisera are mixed with the suspensions [see this *Bulletin*, 1945, v, 42, 20]. Quantitative results were obtained when the antisera were of high potency.

In the 4th chapter, FULTON, VAN DEN ENDE, ELFDORF, and MILLS, describe the results of various tests of the potency of murine-typhus vaccines prepared in four different ways—(a and b) from yolk-sac cultures purified by Craigie's method and in the crude form (c and d) from infected mouse lungs in the crude form or after purification by Fulton and Begg's kieselguhr method in which triturated lung suspensions are differentially centrifuged and further purified by the addition of a suspension of kieselguhr by which tissue particles are carried down leaving an almost pure suspension of rickettsiae. Details of the method are given.

When vaccines were prepared so that they contained approximately equal numbers of rickettsiae, no significant difference was found in the potency of the four vaccines. It was assumed that the so-called soluble antigen contained in Craigie's vaccine could not have a great immunizing value. Yolk-sac vaccines had the great advantage of high yield; one yolk sac supplied nine times as much vaccine as one mouse lung.

The most reliable and convenient method of testing vaccines was considered to be the estimation of their power to protect mice against the "toxicity" of rickettsiae injected intravenously.

In the 5th chapter, FULTON and BEGG deal with the antigenic structure of epidemic and murine rickettsiae; they describe a large series of agglutination and complement-fixation tests, on the basis of which a very interesting hypothesis is proposed. Two propositions are stated—(1) "Antibodies formed in response to one antigen, although adjusted to a certain structure, are not entirely uniform, but vary in specificity to some extent," and (2) "The heating of some antigens to 100°C. creates a new specificity." In this connexion it is also assumed that "a labile antigen may be degraded *in vivo* and give rise to antibodies not only to its native form but also to those degradation products which are antigenic."

The authors' hypothesis differs from the one generally accepted in that the

The hypothesis is somewhat complicated, but not more so than the antigenic structure of the rickettsiae; it will be studied with keen interest by serologists; its chief practical bearing is that in serum tests for differentiating epidemic and murine typhus "it is essential to confine attention to that fraction of antibodies, in each immune serum, which is highly specific," and therefore to use freshly prepared antigens which have not been degraded by heat or chemicals.

sections into which it is divided are devoted to various biological phenomena connected with parasitism, the examples being selected from diverse groups of parasites irrespective of their systematic position, provided they serve to illustrate the same phenomenon

The first part of the book is devoted to parasitism in general and to a characterization of parasites and their life-cycles. The author first discusses the concept of parasitism and arrives at a definition of parasites as "organisms which utilize other living organisms as a source of food and habitat". He further considers the various forms of entozoic relations which are divided into

sitological investigations of ectoparasites

The third and last part deals with the host parasite relationships, 112

workers in parasitology as well as to biologists in general, and Russian readers are fortunate to have it at their disposal. It is to be hoped that it will be made available to foreign readers as well.

C. A. Hoare

TROPICAL DISEASES BULLETIN.

Vol. 44.]

1947.

[No. 5.

SUMMARY OF RECENT ABSTRACTS.*

IV. TRYPANOSOMIASIS.

Epidemiology: Aetiology: Transmission.

DE AZEVEDO *et al.* (p. 828) have investigated the question of sleeping sickness in Portuguese Guinea, where they found 61 of 8,543 persons infected. *G. palpalis* is, apparently, the vector. They conclude that the effect of this disease on the general mortality is slight, and that the strain of *T. gambiense* is of low virulence.

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BURTT (p. 1121) records observations on transmissibility and other features of *T. rhodesiense* after infection of an animal with a low body temperature (ant-bear). For the results and discussion the original should be consulted.

FULTON and STEVENS (p. 1121) have investigated the glucose metabolism of *T. rhodesiense*.

CAUBET (p. 312) has measured the trypanosomes of two strains of *T. gambiense*, which differ in the infections they cause in animals. One strain (Yaundé) was

by: Caubet, and states that the characters of the Yaundé strain have not varied since its isolation, which suggests that it is a special racial type; it has marked neurotropic characters. It is possible that selection occurs in man when the infection passes from the early (blood and lymphatic) stage to the late (nervous) stage, and that the selected races are spread by tsetse in nature. This could explain the variations often observed in sleeping sickness areas. ROUBAUD *et al.* (p. 419) show that the Yaundé strain of *T. gambiense* has constant and strong neurotropic characters in white rats, whereas the Antwerp strain, which produces more acute infections, shows relatively little neurotropic tendency. STEFANOPOULO *et al.* (p. 417) have demonstrated that the neurotropic character of the Yaundé strain of *T. gambiense*, shown in the mouse and rat, is also apparent in the rabbit.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

RODHAIR and RESSELER (p 424) failed in attempts to distinguish schizotrypanosomes serologically from trypanosomes

hatch, either in an incubator at 30°C, or at laboratory temperature below the

t twice as many

The reason is

not clear, but it is possible that *G. morsitans* females do not survive mass confinement so well as males, and that there is a higher early death rate in females than in males

JACKSON (p 420) has shown that in nature (as in cage experiments) the male *G. swynnertonii* mates at random with female *G. swynnertonii* and *G. morsitans*; the same is probably true of male *G. morsitans*. Yet though heterogamou matings are almost always barren, neither species appears to possess any mechanism to prevent their occurrence

In an attempt to discover why different species of *Glossina* are found in different types of country, JACKSON (p 312) introduced *G. morsitans* and *G. palpalis* into territory in which *G. swynnertonii* normally occurs. *G. morsitans* was able to produce a second generation, but *G. palpalis* was not. Neither could survive, but laboratory experiments designed to elucidate this fact suggested that the ability of each species to colonize a particular type of country is related rather to its behaviour (frequency of feeding, choice of resting place)

and the Congo the flight of this species has been stated to be noiseless

Pathology Clinical Findings

STEFANOPOULO *et al* (p 420) have found the "mulberry cells" of Mott in two of eleven white rats infected with the Yaundé strain of *T. gambiense*. In one they were present in brain tissue, in both in the spleen. These cells are probably not pathognomonic of trypanosomiasis

GALLAIS (p 633) has made a systematic description of the neuro-psychological forms of sleeping sickness, which bear a likeness to each other, and which result, fundamentally, from involvement of the region round the third ventricle. The symptoms may be classified as tropho-vegetative, psychic, motor and sensory. CHABELF and MBAPPE (p 1122) discuss the aetiology of certain chronic nervous (and in most cases mental) disturbances, mostly with grossly abnormal cerebrospinal fluid seen in the French Cameroons, in an area where sleeping sickness is not common. They reach the tentative conclusion that many of these cases are, in fact, due to trypanosomiasis, though trypanosomes could not be found

RIDLEY (p. 534) has examined the eyes of 215 West African patients suffering from trypanosomiasis. He concludes that inflammations due to the presence of trypanosomes in the tissues of the eye are rare and terminal; that ocular abnormalities, the commonest of which is papilloedema, are secondary to infection of the meninges and central nervous system; that concurrent onchocerciasis is common and ophthalmologically important, and that the risk of amblyopia, and even amaurosis, from therapeutic arsenic is serious. He (p. 1018) describes in detail the visual disturbances which may follow the use of pentavalent arsenical preparations, especially tryparsamide, in sleeping sickness; these may be evanescent, or lead to partial or complete permanent blindness. He thinks that impurities may be responsible for these effects, and stresses the importance of pure and fresh preparations, and of complete examination of the eyes before injection.

Treatment.

HARDING (p. 105) has made a careful study of the effects of treatment in a district of Sierra Leone, and for the purpose has followed up for 13-28 months (occasionally for 46 months) 2,713 cases of sleeping sickness. The drugs used were antrypol, tryparsamide, propamidine and pentamidine, in various combinations. He makes the point that the only reliable criterion of cure is the cerebrospinal fluid picture, and that the cell count is a more sensitive index than the total protein estimation; in assessing cure, he adopts 10 cells per cmm. as the normal limit. After discussing the effects of the different combinations and courses of these drugs, Harding makes the following rule, applicable for all occasions, "if it is convenient to arrange an interval of 3 weeks or more without treatment after the first dose of antrypol has been injected, then a further two of antrypol followed by five of tryparsamide are given; if the interval is between 2 and 3 weeks, only one further antrypol and six tryparsamides are given; and if the interval is less than 2 weeks, then no further antrypol is administered and the course is completed with seven doses of tryparsamide. This rule has since been applied over many thousands of cases, and it has been consistently found that no more than about 1 per cent. of patients die during treatment and no more than 1 per cent. become blind." The author has tried a combination of pentamidine with tryparsamide, and advises that this should be tried in other parts of West Africa, where the average case is less responsive to treatment with tryparsamide. He also gives evidence which suggests that antrypol and the diamidines, but not tryparsamide, exert, in addition to their curative action, a prophylactic effect which lasts for more than a year; but he makes the point that this is not necessarily true throughout West Africa. Nevertheless, the inclusion of one or other of these two drugs in courses of treatment probably reduces the danger to the community arising from the possibility of subsequent infectious relapse or reinfection among the treated persons.

LAUNOY (p. 423) from experiments on rabbits infected with *T. annamense*, concludes that they offered no evidence that albuminuria due to trypanosomiasis was a contraindication to treatment with moranyl [Bayer 205]. He reaches (p. 424) the same conclusion in relation to treatment with moranyl and anthiomaline simultaneously.

DEWEY and WORMALL (p. 830) show that Suramin [Bayer 205] combines rapidly with proteins, and that much of it found in serum is in combination with the proteins. Hydrolysed Suramin, however, does not combine with protein nearly so much. In comment, HAWKING states that there is some evidence that Suramin also combines with trypanosomes.

EAGLE (p. 421) produces evidence for the view that ionized salts of acid-substituted phenyl arsenoxides are much less active against trypanosomes than

the undissociated free acids. The relative trypanocidal activity of an acid substituted phenyl ar enoxide is determined by and is roughly predictable from —(a) the pH of the solution (b) the pK of the compound (c) the trypanocidal activity of the ion. The higher the pK and the lower the pH the greater will be the observed activity of the compound. He notes that ions of weak acids or bases do not pass so readily through cell membranes as the corresponding undissociated molecules. The arsenicals here studied pass into the trypanosomes very rapidly and form firm compounds with the cell constituents. They are therefore removed from the diffusion equilibrium and as a consequence continued diffusion and concentration occur.

of body weight or within 1 week by 6-7 injections of 1 mgm per kgm. The injections are usually given intravenously.

WEINMAN and FRANZ (p. 207) report on short term results of treatment of trypanosomiasis in Liberia with Melarsen oxide and a substance known as 70A. The conclusions are strongly criticized by LOTRIE who considers that the tests of efficacy admitted by these authors are not by any means stringent enough.

Experiments by ROUBAUD and CALBET (p. 418) indicate that in rats infected with a strain of *T. gambiense* and treated with sulpharsenol as soon as trypanosomes appeared in the blood some relative immunity specific for *T. gambiense*, is developed.

CHEN and GEILING (p. 315) have assayed the anti trypanosome effect of certain antimonials (using *T. equiperdum* as the test organism) by estimating the degree of interference exerted by the drug on glucose metabolism by the trypanosomes. By this method there is good agreement with results previously found by other *in vitro* tests for trivalent but not so good for pentavalent compounds.

LWOFF *et al* (p. 313) have tested various derivatives of ethylene-diamine on

Control

McLEITCHIE (p. 1022) has given a most informative account of the origin and development of the Anchau settlement in Northern Nigeria in which systematic eradication of tsetse and settlement of population have taken place over a number of years. The many problems which had to be met in this great venture include not only medical but also veterinary, agricultural and social

foci and are associated with certain trees and shrubs (named in the original paper) these were cleared along several hundreds of miles of river working down stream and the result has been a tremendous drop in the fly population,

a very great diminution in the incidence of sleeping sickness, and the opening up of 1,000 square miles of country. The old method of clearing the vegetation round water supplies and at river crossings was unsuccessful and has been abandoned. The reclaimed land is being developed satisfactorily. STEWART (p. 907) cleared *G. palpalis* and *G. tachinoides* from a valley in the Gold Coast by removing trees fringing the river. Erosion was feared afterwards, but did not occur; the profuse growth of grass held the soil together, and the river never flows fast.

LEWILLON (p. 208) describes an easily constructed trap effective for *Glossina palpalis*; for details the original abstract should be consulted. He claims that trapping is a practical method of control.

... of tsetse fly operations carried out in Southern
... the point that intensive shooting of game may
... the control of *G. morsitans* in Portuguese East
Africa.

The Trypanosomiasis Committee of Southern Rhodesia (p. 907) have issued a statement of the scientific basis of the control of *G. morsitans* by game destruction. This fly depends on the larger grazing and browsing mammals for its regular food supply, and if these are eliminated the fly is driven to extend such energy in the search for food that its death rate rises far above normal. It is, therefore, not necessary to destroy all species of animals on which the fly can feed, but only those on which it chiefly depends throughout the year. When this has been done, the fly cannot support life where grass is high and dense. *G. pallidipes*, which can find its prey even in thick vegetation, is much more difficult to control by these means.

HAVEAUX (p. 1019) has given a detailed account of 20 years of sleeping sickness control carried out by a mining group in villages of the Kasai region of the Belgian Congo. This control has, apparently, been entirely a matter of treatment, and of prophylactic injections of Bayer 205. Treatment at first consisted of injections of atoxyl, but later, Bayer 205 and tryparsamide were used, and the author gives details of the various methods employed. The results followed to the satisfaction of the community, and the control is easily maintained.

persons, under the existing local conditions. He notes that mass movements of the population, due to local wars, industrial development, etc., have conduced to the spread of the disease. There are no references to tsetse fly control.

VAN HOOF *et al.* (p. 536) conducted a controlled experiment on drug prophylaxis with pentamidine in a *T. gambiense*-*G. palpalis* village of the Belgian Congo, and conclude that one intramuscular injection of 3 mgm. per kgm. body weight will protect a healthy person for at least 6 months. In comment, CORSON suggests that a planned experiment with volunteers and isolated infected flies might reduce some of the unknown factors in the authors' work.

Trypanosomiasis of Animals.

FIENNES (p. 16) describes what he believes to be micro- and macro-gametes of *T. congolense*, in a drop of infected blood to which a drop of 0.3 per cent. sodium chloride solution had been added, and their conjugation to form oöcysts, zygotes and sporozoites. He gives details of the appearance of the structures described.

WIEN (p. 716) has tested 19 diamidines and 9 phenanthridinium compounds for activity against "acute" and "chronic" strains of *T. congolense* in mice. The outstanding compound was phenanthridinium 1553, which has already given promising results in cattle in Uganda [CARMICHAEL and BELL, this *Bulletin*, 1945, v. 42, 259], and which has an index of 152 when tested against

... .. depression on
... .. ic to the liver

LAUNOY (p 314) shows that *T. congolense* (a species with much natural resistance to drugs) and a strain of *T. annamense* which has acquired resistance to of

ag
pe. may be due in part to an immuno-
... .. 1125) produce evidence to show
... .. of infected and treated mouse
... .. of the parasites. The authors

discuss the matter

SCRATZ *et al* (p 1025) have found several soil fungi which produce filtrates active against *T. equiperdum* *in vitro* but not active against bacteria

AUGUSTINE (p 1025) has shown that in *T. lewisi* infection of rats, immunity to reinfection depends upon a humoral trypanocidal antibody, to which developing parasites are particularly susceptible

Chagas's Disease

MARTI interesting epidemiological study of a
focus of wattle
hovels, 3 were
infected and dogs cats and armadillos were also found to be infected

tracted there

LITTLE and SUBBAROW (p 538) describe a medium for the cultivation of *T. cruzi* in large volumes for details the original must be consulted

ROMANA and TERRACINI (p 110) have succeeded in infecting mice with *T. cruzi* through the apparently intact skin

DIAS and DE FREITAS (p 108) contribute a first paper on the biometrical study of haemoflagellates of the genus *Schizotrypanum* which are parasites of various mammals. Certain measurements are discussed and assessed in relation to their importance for determining species

DIAS and TORREALBA (p 109) claim to have isolated *Trypanosoma rangeli* from man in Venezuela. This parasite had previously been found in Triatomid bugs but the vertebrate host was apparently not known. In comment HOARE suggests that elucidation of certain points is needed before the authors' conclusions can be accepted

FLOCH and DE LAJOLIE (p 908) have found *T. cruzi* in *Rhodnius pictipes*, *R. prolixus* and *Triatoma rubrofasciata* in French Guiana

FULTON and HARRISON (p 1123) describe an outbreak of *T. cruzi* infection in monkeys recently imported from India. They discuss the possible mode of infection and do not exclude the possibility of laboratory infection. In concerned *T. cruzi*

reliable test in chronic Chagas's disease. They have used inoculation with *T. megistius*, *T. infestans* and *T. triticeps* for the purpose and by this means have found considerable numbers of positive results in groups of patients suspected of

the disease, including some with myocarditis and some with megaesophagus. LIEM and VAN THIEL (p. 719) have prepared a dried antigen from a culture of *T. cruzi*, for use in a complement fixation test in Chagas's disease. The test was positive in a few controls—patients with positive Wassermann, or suffering from chancroid—but the authors suggest that the antigen should be tried out in known cases of Chagas's disease in South America.

LARCHER and ROMANA (p. 110) describe the appearance of the local swelling associated with infection by *T. cruzi* through the bite of a Triatomid bug. This is red, oedematous, hard, and slightly painful on palpation, and may take one of various forms. The associated glands contain developmental forms of *T. cruzi*.

MAZZA, MIYARA and JORG (p. 208) describe in detail the histological changes in portions of the conjunctiva taken by biopsy in the early stage of Chagas's disease. Details of these changes are given in the original abstract. The authors found leishmanial forms of *T. cruzi* in nodules of the conjunctiva of a man who had been bitten on the eyelid by an infective bug.

MAZZA (p. 831) again stresses the fact that any association between Chagas's disease and goitre or cretinism is entirely fortuitous.

DIAS (p. 830) describes 254 cases of Chagas's disease seen in Minas Gerais; abnormal electrocardiograph records were found in 97. TORREALBA (p. 831) notes that although other causes of myocardial disease occur in the rural population of part of Venezuela, the commonest is Chagas's disease. He quotes cases of sudden death from this cause. RAMOS and LAUS (p. 909) describe six cases of myocarditis in Chagas's disease. BRASIL (p. 908) has given a succinct account of the chronic cardiac lesions in Chagas's disease. ROMANA (p. 111) has found *T. cruzi* in the valves of a dog's heart.

BORGES-FORTES (p. 316) describes the acute lesions of the nervous system which may occur in Chagas's disease, with early localization of the parasites in meninges, brain or medulla, the primary site being in the neuroglia cell. He also describes the degenerative foci of the chronic form, which may be found in the cortex and the caudate and lenticular nuclei, and the inflammatory and degenerative foci in the meninges.

MAZZA *et al.* (p. 909) describe small, punched-out ulcers, papular eruptions and other cutaneous manifestations of Chagas's disease.

PÉREZ and ROMANA (p. 112) describe a patient who has had Chagas's disease for 20 years, and is now, apparently, a simple carrier; and a case of spontaneous cure.

BROWNING *et al.* (p. 633) describe two phenanthridinium compounds which show activity against *T. cruzi* in mice, comparable with that shown by the compound Bayer 7602 (Ac). The degree of activity, though the best yet encountered, is still not of a high order. The correct composition of Bayer 7602 (Ac) is disclosed in a comment by LOURIE. MAZZA *et al.* (p. 720) give good reports of the British equivalent of the German preparation Bayer 7602 (Ac), and also of penicillin, in Chagas's disease.

TALICE and LÓPEZ-FERNÁNDEZ (p. 112) report on the use of *p*-arsenophenyl butyric acid in Chagas's disease, but not very optimistically. This drug has been used, with some moderate success, in African trypanosomiasis.

TALICE (p. 112) notes that penicillin was quite useless in one case of Chagas's disease, which confirms the experiments made in animals.

ENGEL (p. 111), unlike some previous workers, has failed to observe any tendency towards cure of a certain new growth of mice by treatment with a toxin prepared from *T. cruzi*.

Charles Wilcocks.

spleen intra and extracellularly. Similar forms were found in the spleen of a *P. falciparum* infected patient who died on the eighth day. In all these cases the post mortem examinations were conducted from six to 24 hours after death.

Attempts were then made to discover exoerythrocytic forms in malaria patients in whom relapses could be anticipated. It is remarked that relapses in benign tertian malaria not infrequently follow blood induced infections and that they are not so rare as some observers think. It has been noted that when

puncture was performed on 10 patients after cibazol treatment. In smears of the spleen material a few small intracellular forms with one or two chromatin dots were found. Similarly in the spleen of a case of benign tertian malaria similar forms were seen. The various forms found in these investigations are clearly depicted on a coloured plate.

The general conclusion of the authors is that their researches have convinced them that in human as in avian malaria there is a reticulo endothelial cycle which precedes the erythrocytic phase. They admit however that a complete proof of its existence can only be accepted when forms resembling the micro

C M Henyon

See also p 542. MER BIRNBAUM & AIOUB. The Attraction of Mosquitoes by Human Beings.

IVANOVA L V [Light Reactions of *Anopheles* Larvae on a Moist Surface] *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 2 53-5 2 figs [In Russian]

It is known that under natural conditions larvae of *Anopheles* are capable of crawling over moist surfaces when escaping from a drying pool in search of water.

Working with crawling larvae of *A. maculipennis atroparvus*, *A. m. messeae* and *A. superpictus* belonging to stages III and IV the author studied their

for they refuse to crawl up a declined surface. It was thus shown that the reactions of crawling anopheline larvae to light differ markedly from their reactions when in water in that the sign of phototaxis is positive in the latter case and negative in the former. C A Hoare

TREDRE R F. The Role of *Anopheles gambiae* var *melas* in the Transmission of Malaria in the Vicinity of Freetown Estuary, Sierra Leone, 1943. *Ann Trop Med & Parasit* 1946 Dec v 40 Nos 3/4 380-420 2 maps numerous graphs & diagrams & 21 figs on 5 pls [15 refs]

The author carried out in the vicinity of Freetown a careful investigation of the importance of *A. melas* as a vector of malaria the results of which he

describes, together with an account of the methods and effects of the control measures employed.

In Freetown the progress of sanitation since its inauguration by Ross in 1901 has effected a great reduction in malaria resulting in delayed development of immunity in the children and an increasing incidence of clinical malaria in the adult African inhabitant. In the villages, however, near which large numbers of the armed forces were of necessity accommodated, malaria was uncontrolled until the recent war, spleen rates in children varied from 32 per cent. to 76 per cent. and immunity was acquired in childhood, adult malaria being rare.

Investigation of the house-frequenting anophelines had shown that they included a large proportion of melanic *gambiae* with either three- or four-banded palps, but, until the work described in this article, no attempt was made to control this saline-water breeding species. MUIRHEAD THOMSON's description of the egg and recognition of the main breeding places of *A. melas* as being in the belt of *Paspalum* and *Avicennia* mangrove in tidal marshes was fundamental to the present investigation. Pool formation in this zone depends on tidal inflow occurring at average spring tides, but in the wet seasons seepage

It was found
area of *Avicennia*,
they matured; the
aquatic stages are not found in *Rhizophora* mangrove. As a result of these conditions *melas* production rises rapidly at the onset of the rains, reaching a peak in a few weeks. The heavy rains cause a decrease in breeding, which rises again as the rains diminish; and a high production is maintained until towards the end of the dry season when it falls to a low level. These data indicated where and when dense *melas* breeding could be anticipated and where control measures could be expected to cause a reduction in malaria transmission, particularly during the dry season when the breeding of *gambiae* "type" was minimal.

Aerial photographs of the mangrove forests round Freetown identified the "orchards" of *Avicennia* which were found to form only a small proportion of the total. These orchards were visited and all those near African dwellings

and the results of control by exclusion of tidal waters.

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proportion of *A. gambiae* and *A. melas* among anophelines of the *A. gambiae* group collected in adult catching stations.

A total of 1,000 *A. melas* were dissected; 4.2 per cent. were found infected in the salivary glands and 4.7 per cent. showed oöcysts. The peak density of infective *A. melas* was found to be in June when density of the species was greatest, and the maximum sporozoite rate was recorded in March when *melas* density was almost at its lowest. The predominant house-frequenting anopheline in various villages along the south shore of the estuary was *A.*

These brief extracts make no pretence of being a summary of an interesting paper an epitome of the historical facts and speculations produced is not possible
 Norman White

YOUNG M D ELLIS J M & STUBBS T H Studies on Imported Malariae
 5 Transmission of Foreign *Plasmodium vivax* by *Anopheles quadrimaculatus* Amer J Trop Med 1946 July v 26 No 4 477-82

This paper describes the attempted transmission of strains of *P. vivax* of *A. quadrimaculatus* yphilitics except for H 7 per cent were infected 92.1 per cent on the first attempt Of the 30 negro patients only 31.4 per cent were infected 98.5 per cent on the first attempt

Norman White

MELENEY H E The Physiological Pathology of Malaria Reprinted from Publication No 15 of Amer Ass for the Advancement of Science 1941 223-30

This paper is a short review of the physiological changes produced in human subjects and experimental animals by the various species of malarial parasites. The author deals briefly with the possible clinical effects of the continuous repetition of schizogony in the blood stream and then considers in more detail certain changes in the physiological pattern of the infected animal. Total serum protein is generally reduced in both the acute and latent stages of malaria. Albumin is affected most. Total globulin is often increased and the proportion of euglobulin always. Some authors have found these changes most pronounced during and after the paroxysm. Alteration in sedimentation rate and other physico-chemical changes in blood reported in malaria and the

whelmings and where haemoglobinuria occurred as a terminal event. Some authors have suggested that cholesterol might therefore possess an inhibiting influence on haemolysis. This has not been confirmed experimentally. Lecithin concentrations follow those of cholesterol.

A rise in blood sugar has been reported during fever in *P. vivax* and *P. falciparum* infections. This rise might result from increased glycogenesis such as is seen in protein shock. In this connexion decreases in both laevulose and galactose tolerances have been observed in malaria. The principal change in blood electrolytes observed in malaria is a rise in plasma potassium seen especially in *P. vivax* infections and occurring in the early stages of the paroxysm. In monkeys similar rises in potassium were observed at the time of sporulation. The increase in potassium was greater than could be explained by the destruction of erythrocytes so that some appeared to come from tissue cells. The clinical effects of malarial invasion may be related to the toxicity of high plasma potassium concentration. Adrenal hypofunction possibly resulting from the high blood potassium may also be concerned in the production of the clinical picture. The chemical composition and possible rôle of haemozoin and other pigments are discussed.

The anaemia in malaria is usually of the secondary type, although primary anaemia has been described. Progressive reduction in erythrocyte numbers leads to corresponding loss of the oxygen-carrying capacity of the blood and tissue respiration is thus probably interfered with. Clinical observations have shown that the circulation is often profoundly affected in malaria, particularly in *P. falciparum* infections. Such circulatory changes may be due to "plugging of capillaries" by parasitized red cells and the "liberation of toxic substances from these erythrocytes on the completion of schizogony." The plugging of capillaries probably accounts for many of the severe symptoms of *P. falciparum* infections. The progressive blood destruction, pigment metabolism and interference with circulation seen in malaria place heavy burdens on the organs, especially the liver and kidneys. Functional changes in both organs have often been reported during malaria. The author considers that the acute renal failure of blackwater fever results chiefly from mechanical obstruction of the kidney tubules.

[This paper is disconcertingly brief. The literature reviewed is limited, but the subject is one of absorbing interest and importance.] B. G. Macgrath.

TALIAFERRO, W. H. The Cellular Basis for Immunity in Malaria. Reprinted from *Publication No. 15 of Amer. Ass. for the Advancement of Science*, 1941, 239-49, 2 pls.

This is a short restatement of the cellular aspects of the host response to malarial invasion. Studies of tissue obtained from monkeys infected with malaria have revealed cellular activities which are usually missed in the examination of human material in which serial studies are not possible and degenerative changes tend to predominate. The characteristics of malarial immunity are determined in the first case by the localization of the parasites in certain tissues and the cellular response shows itself in four ways: phagocytosis; the production of new phagocytes; reparative proliferations, the production of specific antibodies.

The author deals with the first three of these responses. A careful account of the cells involved is given, based mainly on the results of histological investigations in simian malaria. The active cells are mainly mesenchymal in origin and are found in the blood and lymph, the reticular or blood forming tissues and the widely dispersed loose connective tissue. The functional importance of these cells is dependent on their wide distribution, their capacity for phagocytosis, their ability "to secrete enzymes and antibodies" and their varying powers of development into other forms of cells.

Fixed macrophages, which are defined as any large phagocytic monocytes, or any such cells which are capable of becoming immediately phagocytic, are derived from the bone marrow, the lining of the sinusoids of the liver, clasmatocytes, resting wandering cells of the tissue, The endothelial cells of the blood vessels, the so-called "fixed" macrophages, so. Free lymphatic stem cells, and lymphocytes reproduce lymphocytes, but under abnormal stimulus, as in malaria, both may develop into any type of mesenchymal cell. In the author's view "the lymphocyte is probably the single most important source of new macrophages in malarial immunity." Hyperplasia of the reticulo-endothelial system (i.e. the macrophage system) is frequent in malaria. The author considers that the newly-formed macrophages come principally from lymphocytes within what he terms the "lymphoid-macrophage system",

The author's attempt to correlate physiological processes with the head-ache in cerebral malaria is commendable. A good deal of the literature on this subject is both obscure and inaccurate.

B G MA

was cerebral malaria
The author's attempt to correlate the picture of cerebral malaria is commendable, however, highly speculative and some of it both obscure and
LAVIETES P H LONDON J M SCHROEDER E F
Combined Quinine-Plasmoquin Treatment of Vivax
Amer J Med Sci 1946 Nov 212
MOST H KANE C A
& HAYMAN J M Effect on Relapse Rate
[13 refs] attacks of P. vivax malaria of Pacific
malaria naphthoquinone

crust, sulphate 1 gm. on days
8 hour intervals smogque naphthoate 0

7 were given

were given together. The total amount received during the 14 days was quinine sulphate 29 gm. and plasmoquine naphthoate 0.84 gm. The patients treated with quinine alone received similar doses to those above over a 14-day period. Patients in the third group each received 2.8 gm. of quinacrine during 7 days. Parasite counts were done daily until negative for 3 consecutive days. Haemoglobin, methaemoglobin and total white blood cell count determinations were made daily. After completion of treatment, the patients were transferred to a convalescent area where they were kept under observation until relapse or for a minimum of 120 days: during this period, blood smears were examined twice weekly. If parasites were found, temperatures were taken every 4 hours and daily parasite counts were made. A temperature of 100°F. or over, associated with parasitaemia, was considered a clinical relapse.

Among the 75 patients treated with quinine alone, 62 (82.8 per cent.) had a clinical relapse within 120 days, five others had a parasitaemia at some time during this period. Among the 69 patients treated with quinacrine, 56 (81 per cent.) had a clinical relapse and another two had parasitaemia. Among the 72 patients treated with quinine and plasmoquine, there were only three who had clinical relapses (4 per cent.) and five others showed parasitaemia at some time during the 120-day period.

No serious toxic manifestations were observed in 100 white patients who were given combined quinine-plasmoquine therapy for 14 days.

The authors consider that the occurrence of repeated attacks of *P. vivax* malaria at short intervals during the first six months of the disease, or repeated attacks later in the disease, is an indication for the use of combined quinine-plasmoquine treatment. Each case must be considered individually and the merits of possible cure weighed against potential toxicity. There was no evidence of serious toxicity in the authors' cases, but the patients were all white, in good physical condition, and were closely observed in hospital.

Norman White.

BROWN, M. & RENNIE, J. L. Mepacrine Metabolism in Recurring Benign Tertian Malaria. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 337-46, 3 figs.

This paper deals with the metabolism of mepacrine (atehrin) in Service personnel with recurring benign tertian malaria. Plasma mepacrine concentrations during a standard course of treatment were significantly lower in patients who were suffering from relapses than in primary cases. The low plasma levels were found in those without parasitaemia or symptoms as well as in others who were undergoing an attack and were not accounted for by excessive excretion in the urine. Also there was no relation between the plasma mepacrine and the amount of drug present in the faeces. It was believed that failure of absorption may have occurred in a few cases, but plasma levels were not, in general, significantly raised when intramuscular instead of oral administration was tried. In these cases it was shown that there was no abnormal distribution of mepacrine in the various components of the blood. Observations are recorded on the changes of drug concentration in the cellular elements of blood during therapy, and it appeared that in the white cells part of the drug absorbed may be bound more firmly than the remainder and is less readily exchanged with other tissues. The sequence of events in white cells was believed to be a fair representation of what occurred in tissues. Since there was a high coefficient of correlation between plasma mepacrine concentration and that in white cells, the low plasma levels in some patients was probably not due to a high tissue concentration of the drug. The chief cause of low plasma concentration in the recurring cases of benign tertian malaria was attributed to a more rapid destruction of the drug in the body.

J. D. Fulton.

[May 1947]

ANN TROP MED & PARASIT 1946 Dec v 40 Nos 3/4 472-81 5 figs
[10 refs] Blood and Plasma Concentrations of Mepacrine in Subjects taking
Suppressive and Therapeutic Dosages [Army Malaria Research Unit
Oxford (MAEGRAITH B G *et al*)]

In fasting subjects who had not previously taken the drug 100 mgm oral mepacrine produced a peak of plasma concentrations within four hours in most cases. In subjects on daily suppressive therapy with the same dose the character of the plasma concentration curves remained unchanged over a period of 58 days provided the conditions of administration remained constant. This fact suggested that absorption from the alimentary tract was unimpaired during the period of observation. In the case of whole blood the level of concentration was considerably raised at the end of the above experiment. In two groups of volunteers a daily oral dosage of 100 mgm mepacrine gave rise to mean values in plasma concentration of 26.0 and 28.0 μ gm per litre in the case of men and women respectively six weeks after administration was started and these values remained fairly constant during a 10 months course. Six weeks after treatment ended the drug was usually absent from the plasma. The mean whole blood concentration was 150 μ gm per litre and the levels in both plasma and whole blood varied greatly in individuals. The variations in whole blood were considered less significant than those in plasma with regard to the suppression of malaria. During a therapeutic course of treatment in which 4.6 gm mepacrine was given over a period of 12 days to patients with benign tertian malaria the mean plasma concentrations ranged from 20-130 μ gm per litre. About 10 mgm of drug was excreted daily in the urine but in this case also there was considerable individual variation. J D Fulton

ANN TROP MED & PARASIT 1946 Dec v 40 Nos 3/4 368-71 The Effect
of Muscular Exercise in a Hot Moist Environment on the Mepacrine Con-
centrations of Blood, Plasma and Urine [Army Malaria Research Unit
Oxford (MAEGRAITH B G *et al*)]

In this investigation carried out in 1944 twenty two volunteers receiving 0.1 gm mepacrine (alebrin) daily over a period of several weeks took strenuous exercise in a hot moist chamber maintained at 32-35°C with a humidity of 70-85 per cent for 4 hours on 4 or 8 consecutive days in order to see whether the plasma concentration of the drug was affected. The conditions in some respects approached those in the tropics where persons receiving suppressive treatment on similar lines were not always protected against malarial attacks. The intake of fluid and salt was noted but not restricted and each subject was weighed before entering and after leaving the chamber in which a scheduled amount of work was performed. The urinary output while in the chamber was measured and the sweat loss calculated. Chemical observations were also made regarding temperature, pulse rate and blood pressure. The method of MASON (this Bulletin 1945 v 42 81) was used to estimate minimal blood and plasma mepacrine concentrations which are defined as those concentrations reached on the dosage regime in question 24 hours after taking 100 mgm (i.e. minimal level prior to a dose). Further estimations were made at various times. Urinary mepacrine excretion over 24 hours was also measured in conjunction with them. The exercise in the hot chamber did not affect minimal level of the drug in blood and plasma. There was an increase in urinary mepacrine excretion while in the chamber and this is believed to be associated with increased excretion of ammonia. J D Fulton

ANN. TROP. MED. & PARASIT. 1946, Dec., v. 40, Nos. 3/4, 482-92, 6 figs.
The Effect of various Substances, Including Food, on the Absorption of orally administered Mepacrine Hydrochloride. [Army Malaria Research Unit, Oxford (MAEGRAITH, B. G., *et al.*).]

In this investigation an answer was sought to the question whether the presence of food in the stomach interfered with the absorption of mepacrine given orally. In carefully controlled experiments, it was found that the final plasma levels of the drug during a course of treatment showed no significant variation whether the drug was given on a full or empty stomach. However, when food was present, the rate of absorption at the start may have been slightly decreased. Urinary output of mepacrine for each 24-hours period during treatment was significantly less in the case of those who received the drug on a full stomach, but after treatment was completed the output of the two groups by this route became less unequal. Large amounts of cellulose in the diet, and the taking of kaolin, magnesium trisilicate or McLean's powder, which readily adsorb the drug *in vitro*, did not affect absorption from the gut. They may, therefore, be taken by subjects receiving suppressive mepacrine without affecting to any extent the plasma levels attained. J. D. Fulton.

ANN. TROP. MED. & PARASIT. 1946, Dec., v. 40, Nos. 3/4, 372-9. The Excretion of Mepacrine in the Faeces. [Army Malaria Research Unit, Oxford (MAEGRAITH, B. G., *et al.*).]

The faecal excretion of mepacrine has been measured at various times in persons receiving 0.1 gm. of the drug daily for different periods. On this dosage over a period up to six months the excretion was not significantly altered. There was great variation in individual excretion, in some cases up to 30 per cent. of the administered dose being eliminated by the bowel. The amount excreted in the bile was previously found to be small, but when the drug was given intramuscularly to a number of subjects, the faecal output was considerable. Elimination of mepacrine by the bowel therefore does not depend on failure of absorption. There was no relationship between the amount excreted in the faeces and the levels of mepacrine in the blood or plasma, or in the urine.

The results of experiments in rats were in agreement with those obtained with human subjects in that no significant increase in faecal mepacrine occurred when the drug was administered over long periods. The value of two different procedures for the estimation of mepacrine in faeces is discussed, and, as before, MASEN's method [this *Bulletin*, 1945, v. 42, 8] was employed in the determinations. It was found that mepacrine hydrochloride was stable in faecal suspensions at room temperature for a period of at least three days.

J. D. Fulton.

KIERLAND, R. R. Drug Eruption due to Atabrine and resembling Lichen Planus. *Proc. Staff Meetings Mayo Clinic*. 1946, Oct. 16, v. 21, No. 21, 404-8.

This report is based on a study of 49 cases. The first appearance of the lesions was usually within 3-6 months after the patients commenced to take mepacrine. When the drug was discontinued, the eruption remained stationary for a variable period and then retrogressed. Pigmentation persisted for months.

The author describes briefly the signs and symptoms which have been referred to in this *Bulletin* on several occasions [1946, v. 43, 301, 303 *bis*; 1947, v. 44, 33].

He noted that the eruption almost invariably occurred in the higher age groups of the population at risk.

The results of routine analysis of blood and urine were within normal limits except when clinical complications existed. Bacteriological studies of individual lesions were made in ten cases. Neither fungi nor spirochaetes were found in the lesions. In 39 cases patch tests for sensitivity to mepacrine were made—the results were negative.

The most serious complication was aplastic anaemia, death occurred in all cases in which this developed.

Histopathological investigation showed that the eruption due to atebriane starts out with histologic changes closely resembling ordinary lichen planus, — — — — — of the striae in the — — — — — haemolytic degeneration of the

simulate those of lichen spinulosus or of lichen pilaris seu spinulosus. The infiltrate may extend deep in the cutis when the lesions in the drug eruption simulate those in lichen spinulosus or in lichen pilaris seu spinulosus. In the more severe types of involvement destruction of the sebaceous glands and later atrophy and destruction of the hair follicle occur, but usually the arrectores pilorum muscle is preserved. Sweat glands may also be destroyed by the infiltrate. In patients who clinically have primary or secondary eczematous features, histologic evidence of eczema is found also.

By the use of special stains for the microscopic examination it was determined that the pigment is melanin. The increase in pigmentation may be marked unless acanthosis is severe. On occasion the acanthosis is so extreme that the changes may be represented as pseudo-epitheliomatous. Unless the cellular

K M B MacKenna

LUM, L C. Fatal Hepatitis associated with Tropical Lichenoid Dermatitis.
Med J Australia 1946 Dec 21, v 2 No 25 866-8

GAGE, J C & ROSE, F L. The Estimation of Paludrine in Urine. *Ann Trop Med & Parasit* 1946, Dec, v 40 Nos 3/4, 333-6 1 chart

so in the presence of alkalis and while insoluble in water it dissolves in organic solvents such as benzene, xylene and chloroform. When its solution in an organic solvent is shaken with sodium diethyldithiocarbamate in water the characteristic colour with copper is produced proportional in intensity to the amount of metal present. By this means Paludrine can be satisfactorily estimated in urine containing 5 to 100 mgm per litre. The test is carried out by

mixing 2 ml. of urine in a test tube with 1 ml. of an aqueous copper sulphate-ammonium chloride solution and 1 ml. normal caustic soda. After a few minutes the tube is shaken with 5 ml. benzene, the benzene layer is then removed, washed with 1 ml. water and shaken with 1 ml. of 0.1 per cent. aqueous solution of the reagent for 1 minute. The intensity of the golden-yellow colour produced in the benzene is measured, preferably in a Spekker absorptiometer, with the aid of suitable filters, and the amount of Paludrine present determined by comparison with a standard.

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but not as much as previously obtained than by the method previously described.

J. D. Fulton.

MAEGRAITH, B. G., TOTTEY, Mary M., ADAMS, A. R. D., ANDREWS, W. H. H. & KING, J. D. The Absorption and Excretion of Paludrine in the Human Subject. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 493-506, 4 figs. [25 refs.]

The absorption and excretion of Paludrine and its distribution in the cellular elements of the blood has been investigated in normal persons and in those infected with benign or malignant tertian malaria. The authors are of the opinion that the suppressive and therapeutic activity of the drug are related to its plasma concentration.

In the present experiments paludrine was given orally as tablets and also intravenously. Estimations were made by the method of SPINKS & TOTTEY [this *Bulletin*, 1946, v. 43, 707] on fresh specimens or in those kept in the cold, although in faeces the drug proved stable under various storage conditions. Plasma concentration curves after various single oral dosages were constructed

Levels up to 500 and 150 μgm . per litre respectively were attained on the large and smaller doses, the peak value being reached about 2 hours after administration. In the case of mepacrine, a point which was not reached. One week after administration ceased, the drug was still detectable in the plasma. In doses up to 50 mgm. given intravenously, no toxic signs were noted and there was a rapid fall from the peak value in the plasma. In one experiment the ratio of whole blood to plasma concentration was about 3.

At two autopsies it was found that the greatest concentration of the drug was present in kidney and next in the liver. The concentration of the drug in a white cell of the blood was estimated to be 50 to 120 times that in an erythrocyte, a ratio which is smaller than in the case of mepacrine. In solution in plasma, about 75 per cent. of the drug appeared to be bound to protein. After single doses, about 40-60 per cent. was excreted in the urine and 10 per cent. in the stools. On the above therapeutic doses of 500 and 50 mgm. twice daily over 14 days, the drug was detectable in urine for 9 and 6 days respectively.

J. D. Fulton.

FINDLAY, G. M., MAEGRAITH, B. G., MARKSON, J. L. & HOLDEN, J. R. Investigations in the Chemotherapy of Malaria in West Africa. V. Sulphonamide Compounds. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 358-67.

This investigation, carried out during the late war and, for security reasons, not previously reported, deals with the treatment of malignant tertian malaria

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in Europeans in W. Africa. Six sulphonamides and a Schiff's derivative from a sulphonated diaminodiphenyl sulphone were used in the treatment of 136 patients. The total dosage over a period of six days was 108 gm in the case of succinylsulphathiazole 26 gm for the other sulphonamides and 25 gm for the Schiff's derivative. Parasites were present in the blood when treatment was begun and the results obtained were compared with those for patients under similar conditions who received treatment with quinine or mepacrine. Duration of fever and parasitaemia were used as criteria of therapeutic effect. The following is the author's summary —

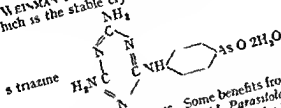
The therapeutic effect of certain sulphonamide drugs has been investigated in cases of malignant tertian malaria in European troops in West Africa. Sulphadiazine, sulphathiazole, sulphamerazine and sulphamerazine had a slight effect in controlling infections but were far inferior to mepacrine and quinine.

Sulphapyrazine and succinylsulphathiazole were of little value. Nineteen of 25 cases treated with sulphamerazine showed gametocytes in the blood films. There is some evidence that such gametocytes are incapable of infecting *A. gambiae* mosquitoes. J. D. Fulton

PAYNE E. H., BALTHAZAR E. & BEZERRA D. A. Preliminary Observations on the Use of Melarsen Oxide in Malaria. *Southern Med. J.* 1946 Dec v 39 No 12 970-72

— & FERNANDES J. S. Further Experience with Melarsen Oxide (a New Arsenical) in the Treatment of Tropical Disease. *Ibid.* 1946 Dec v 43 No 12 207

WEINMAN & FRANZ (this *Bulletin* 1946 v 43 207) found melarsen oxide which is the stable crystalline dihydrate of 2 (4-arsenosulphamido)-4,6-diamino



to be effective in limited trials

of African trypanosomiasis. Some benefits from its use in human filariasis were noted by ROSE & CULBERTSON (*J. Parasitology* 1945 v 31 Suppl. p 17). The present authors have used it in the treatment of 38 cases of acute and chronic malaria (type not always determined) in patients suffering from other diseases. The general course of treatment was 7 intravenous injections of 25 mgm which was tolerated without signs of toxicity. Symptoms of malaria subsided on the 4th or 5th day and there was general improvement in the clinical condition.

Other tropical diseases were treated in the district of Minas Gerais and Goias, Brazil, with doses of 25 to 75 mgm daily for several days. In tropical ulcer, favourable results were obtained with relatively rapid healing. In 35 cases of secondary yaws there was also rapid response to the drug and the results compared favourably with those obtained by mapharsen. J. D. Fulton

GOLDSMITH K. A Controlled Field Trial of SN 7618-5 (Chloroquine) for the Suppression of Malaria. *J. Malaya Inst. of India* 1946 June v 6 No 3 311-16

At the request of the U.S. Army Medical Authorities a test was carried out in August-November 1945 to determine the value of SN 7618-5 (Winthrop

Chemical Co., Inc., Rensselaer, N.Y.). The labourers selected for the trial were living in an isolated group of quarters on a tea estate, where malaria is hyperendemic, in north-east Assam. *A. minimus* is the vector. During the experiment, all anti-larval and anti-adult mosquito measures were discontinued. The drug was given in tablet form: each tablet contained 0.48 gm., 0.3 gm. of base. The dose recommended as a suppressive was one tablet a week.

The subjects were divided into 3 groups: 76 were controls; 74 received one tablet of atabrin daily; 73 received one tablet of SN 7618-5 each week. Weekly blood examinations were made until the end of the experiment. In the eighth week, the control group were given SN 7618-5; the administration of this drug to the two groups was continued till the 14th week. The atabrin group ceased taking the drug in the eighth week. A similar experiment was with three groups of 12 children each, from 6 to 14 years of age; the dosage was made halved.

From the fourth week, there was a sharp rise in the parasite rate of the controls and a significant fall in the parasite rates of the atabrin and SN 7618-5 groups, amounting to complete disappearance in the latter. The few cases of "break-through" in the atabrin group may have been due to irregularities in taking the drug. There were a few cases of intolerance to atabrin, none to SN 7618-5; there were a few pregnant women in the latter group. Children tolerated both drugs well. The large bulk of the SN 7618-5 tablets was the sole inconvenience, especially when they were given to children. On some occasions, SN 7618-5 was given on an empty stomach without any ill effects.

Norman White..

BANG, F. B., HAIRSTON, N. G., MAIER, J. & TRAGER, W. Studies on Atabrine Suppression of Malaria. II. An Evaluation of Atabrine Suppression in the Field. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 753-9, 2 figs.

To determine the value of a drug as a suppressive of malaria it is necessary to have information as to the expected attack rate were suppression not in force. Such information is often unobtainable in field conditions, but by careful parasite surveys of troops, some of the factors in operation may be determined. Men of a highly infected group under rigidly supervised atabrin suppression, who had not had a clinical attack of malaria for some weeks, were examined; parasites were found in 14 per cent. The transient parasitaemia was unrelated to atabrin levels. These men had had only few previous attacks of malaria. In comparable groups of men who had had much previous clinical malaria, the number of positive smears was very small, 2 out of 349. Very rarely does the parasite density in individuals on adequate atabrin suppression exceed 5 per 500 white blood cells.

A careful study was made of a regiment who had been in severe jungle combat for two months in the Buna campaign. Careful history taking, determination of atabrin levels and the examination of blood smears led to the conclusion that at least 98 per cent. of the men in strenuous combat were protected by 1.0 gm. of atabrin a week. This was usually taken in two doses of 0.5 gm. each.

Norman White.

MARIKOVSKI, P. I. [Attempt in the Use of the Energy of Gunpowder Gases for spraying Insecticide Powders.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 2, 55-8, 2 figs. [In Russian.]

The author describes a method of spraying insecticide powders, such as pyrethrum, with the help of a special rocket pistol. This has a barrel 150 mm. long with a bore 26 mm. in diameter. To the end of the barrel is attached a

funnel shaped tin extension 30 cm long. A cartridge 10 cm long is filled with 0.5 gm of black gunpowder and plugged after which pyrethrum is varying with the size of the room to be the pistol is fired a cloud of pyrethrum h the room. In this way it is possible to kill all the insects in 10 to 15 minutes. This pistol can also be used for dusting mosquito breeding places with Paris green. C A Hoare

BRITISH GUIANA Malaria Research Service Medical Department Progress Report for the Half Year January-June, 1946 [GIGLIOLI G Hon Govt Malariaologist] 10 mimeographed pp 2 plans

Preliminary trials of DDT residual spraying of houses in British Guiana carried out in 1945 were described in a previous report [this Bulletin 1947 v 44 181]. The present report describes the considerable extension of the work during the first half of 1946 when 2711 buildings containing 9222 rooms were entered. The population under DDT protection was 16000 excluding some similarly protected since encouraging results of the al spraying on the house- s aegypti were marked.

With the cooperation of the Sugar Industry and the Yellow Fever Service the Malaria Research Service now propose a much extended area of operation including the Demerara River Estuary (population 30089) and the Berbice River Estuary (population of malarious sections about 10000). Such a large-scale experiment should yield unequivocal conclusions as to the value of this mosquito and malaria control method and permit the formulation of a definite control policy. Norman White

JONES H A INCHO H H & DEONIER C C Comparative Toxicity of p p and o p DDT to Larvae of *Anopheles quadrimaculatus* J Econom Entom 1946 Oct v 39 No 5 672-3 1 fig

The *ortho-para* isomer is one of major impurities in commercial DDT and this is known to be much less toxic to most insects than the active *para-para* compound. Tests were made with pure o p DDT and pure p p DDT and mixtures of them in different proportions to larvae of *Anopheles quadrimaculatus*.

From the median lethal concentrations the p p DDT appears to be six times as toxic as the o p DDT to these larvae. Relationship of toxicity to the proportion of p p DDT in a mixture is curvilinear proportions above 20 per cent have a rather greater effect in increasing insecticidal power than would be expected. J R Busvine

ZUCKERMAN A
Induced by
Aug v 79

Chick Embryos
s 1946 July-

After a brief review of the literature dealing with the infection of avian malarial parasites the author discusses the infections were g exoerythrocytic as allantoic membrane

of the embryos from the 4th to the 14th day of development. Secondly, blood containing erythrocytic stages was inoculated into embryos intramuscularly.

By the first method, when the brain emulsion had been successfully fixed to the membrane by plasma clot and the embryo had survived to the 6th day following the operation, infection invariably resulted. Though erythrocytic and exoerythrocytic forms appeared in the embryos simultaneously, the latter predominated. The highest erythrocytic infection recorded involved only 22 per cent. of the red cells. The number of exoerythrocytic stages, on the other hand, often far exceeded the number usually found in three-weeks-old chicks after sporozoite infection. In the embryos they were found in monocytes, macrophages, myelocytes, capillary endothelium or they were lying free in the capillary lumen or amongst tissue cells. In one embryo they were abundant in the circulating blood within leucocytes of every kind and also in all cells of the erythrocyte series, as occurs regularly in *P. elongatum* infections. This embryo exhibited the *P. mexicanum* type of infection of THOMPSON and HUFF. In a coloured plate the appearance of these infected blood cells is shown.

When the second method of infection was adopted by inoculating blood intramuscularly, the result was quite different and, in the case of embryos which lived long enough, resembled the similarly produced infection in adult fowls. There was heavy erythrocytic infection with only a few exoerythrocytic stages. It is noteworthy that when attempts to produce infection by fixing to the chorio-allantoic membrane blood clot containing erythrocytic stages in place of brain emulsion, infection did not occur. This appears to indicate that the infection through the membrane was brought about exclusively by the implanted exoerythrocytic stages.

Testing *in vitro* cultures of spleens from infected embryos by Hawking's tissue culture method, it was found that a more extensive growth of exoerythrocytic stages occurred than when adult spleens were used. By exposing exoerythrocytic forms in embryonic spleen material to the action of drugs

sible therapeutic effect of such
an emulsion with drugs before
the effect of these drugs can

be gauged. Quinine, atabrin and plasmochin were each tested on two embryos. Neither of the first two had any action, but in the case of plasmochin there was a definite suppressive effect on one embryo as the development of exoerythrocytic forms was at least 20 times lower than in the control. In the other embryo, no suppressive action was noted. Sulphadiazine had a marked suppressive effect on the stages in brain emulsion as judged by the degree of subsequent infection in embryos.

C. M. Wenyon.

RIGDON, R. H. & VARNADOE, Nona B. Effect of Oxygen on Malaria. An *In Vivo* Study in Ducks. *J. Lab. & Clin. Med.* 1947, Jan., v. 32, No. 1, 57-65, 5 figs. [11 refs.]

"Ducks with a severe malarial infection when placed in an oxygen chamber immediately show marked clinical improvement. They survive for ten to eighteen hours longer than similarly infected ducks kept in the duck room. This improvement is attributed to the greater amount of oxygen available for transmission to the anoxic tissues.

"The use of oxygen in the treatment of acute malarial infections in man is discussed."

BLACKWATER FEVER

ABBOTT, P. H. A Case of Blackwater Fever during Mepacrine Therapy [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1946, Dec 40 No 3 354-6

A European woman, aged 34 in an area of hyperendemic malaria in the Sudan developed a typical attack of blackwater fever while undergoing mepacrine treatment. She had been given 0.3 gm a day for five days and then 0.6 gm daily. The symptoms of blackwater fever developed when she had taken in all 2.7 gm of mepacrine and one would have expected the blood concentration of mepacrine to have been sufficiently high to afford protection from blackwater fever.

Norman White

DA FONSECA SANTOS, H. S. A febre biliosa hemoglobinúrica na região de Camacupa [Blackwater Fever in the Camacupa District] *Africa Médica* Lisbon 1946 Sept-Oct 12 Nos 9/10 153-80, 6 graphs & 2 figs

The author, who was Health Delegate to Camacupa in October 1943, observed that cases of blackwater fever were unexpectedly numerous [but

January August September and December (with 22 cases in 1943)

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becoming normal 10 days after admission. All were whites.

The author gives in a table 23 medicaments in common use in this district [many of these are purely for symptomatic treatment such as champagne, stimulant and diuretic tonics in convalescence, campolon for the anaemia, etc.]. He then details his own method of treatment but doses are given in some instances only.

The treatment which is shown in detail for three days includes a formidable list of drugs and remedies and is somewhat heroic. [Nevertheless, as the case detailed shows, recovery took place.]

H. Harold Scott

TRYPANOSOMIASIS

FAIRBAIRN, H. & BLITT, F. The Infectivity to Man of a Strain of *Trypanosoma rhodesiense* from Antelope. *E. Afr. Med. J.* 1946, 23, 270-310 3 figs 49 refs

This paper was written to report tests of the infectivity to man during the years 1940-45 of a strain of *Trypanosoma rhodesiense* which was isolated in 1940 by the abstractor and has since been maintained by cyclical transmission by *Glossina morsitans* mainly through sheep and antelopes. The authors' head

T. rhodesiense—The strain was cyclical in animals—the sheep line. "Acta Trop." 1946, 1, 1-10

line " " monkey line " " impala line " " Thomson's gazelle line " and others—tests of infectivity being made on volunteers from time to time, while observations on its transmissibility by *G. morsitans*, and its infectivity and virulence to white rats and other animals were also made. The authors found " that the strain of *T. rhodesiense*, taken as a whole, was still highly infective to man 101 years after isolation and that it showed no signs of reverting to *T. brucei*, as Y

The failure of man to be infected.—Volunteers who had resisted infection from the bites of isolated infective *G. morsitans* were re-bitten by the same fly, or by another fly which had fed on the same infected animal, or by a fly which had fed on another animal infected with this strain. In the case of the same fly, 12 out of 35 men became infected, 4 out of 13 were infected by another fly of the same " isolation ", 6 out of 14 by a fly from a different isolation from the same animal host, and 7 out of 18 by a fly from a different animal host. The authors attribute these results to variations in the dose of trypanosomes injected by the

no decrease of its usual virulence. As these three monkeys were infected yet developed a successful resistance, the authors conclude that it may be possible to

Bejected on to glass slides by the fly when attempting to feed and found that the numbers varied greatly at different attempts by the same fly and with different flies. From these observations and from the tests on volunteers the authors conclude that the minimal infective dose for man of the fly's gland trypanosomes of this strain is about 350. Fairbairn also counted the living trypanosomes ejected by flies and then inoculated them into volunteers; of 19 men so inoculated, 15 were not infected by 88, 111, 128, 143, 146, 177, 188, 206, 220, 308, 362, 680, 800, 833, and 1,067 while 4 men were infected by 170, 284, 389, and 45.

The authors give examples of experiment the importance of the dose of trypanosomes. They suggest that the ability of a fly to inoculate an infective dose depends on at least two factors: (a) the power of the trypanosomes to invade the salivary glands (transmissibility) and (b) the ability of the trypanosomes to multiply in the glands. The virulence of the strain may also be a factor, for the minimal infective dose may be smaller in a virulent line than in a less virulent one.

Factors influencing the transmissibility and dosage of the strain.—There was a correlation between transmissibility and infectivity of the three lines maintained in sheep, Thomson's gazelle, and monkey respectively. Higher transmissibility rates were obtained from some species of animals than from others, but in transfers from one species to another, both transmissibility and dosage were found to increase or decrease together. Transmissibility was also affected by atmospheric temperature; BURTT [this *Bulletin*, 1946, v. 43, 827] incubated pupae of *G. morsitans* and found that transmissibility was increased in the hatched-out flies, that the cycle of development of the trypanosomes in the flies was shortened, and that the viability of the flies was apparently increased. The possible practical importance of this in nature is pointed out.

The virulence of the strain.—This was judged by the length of life of infected animals, especially rats; as the length of life of sheep and monkeys was found to be closely parallel to that of rats, the latter could be used as an index of the

D'ANDURAIN, C. W. Observaciones histopatológicas de *Octodon degus* natural-
[Histopathological Observations
T. cruzi.] *Biológica*. Santiago.
Summary in English by the author.]

"The author communicates the results of a research work on parasite reservoirs of Chagas Disease, carried out in the surroundings of the Mines of Altamira, Domeyko (Province of Atacama, Department of Vallenar Par. 28°50').

degus Moli
examined,

made by means of xenodiagnosis, and was later confirmed through the discovery of leishmanoid forms of the parasites in the tissue of these rodents.

"The histopathological examination of the lesions shows that they do not differ essentially from those observed in laboratory animals experimentally infected with the parasite. In one of the specimens examined, a nest of flagellate forms of the *T. cruzi* was found imbedded in a cardiac muscular fibre."

Pizzi P., T. Algunos aspectos de la enfermedad de Chagas experimental. Comunicación preliminar. [Some Experimental Aspects of Chagas's Disease. Preliminary Report.] *Biológica*. Santiago. 1945, Dec., No. 3, 53-68, 15 figs. [10 refs.] English summary.

BADÍNEZ S., O. Contribución a la anatomía patológica de la enfermedad de Chagas experimental. [Observations on the Pathological Anatomy of Experimental Chagas's Disease.] *Biológica*. Santiago. 1945, Dec., No. 3, 3-52, 64 figs. [29 refs.] English summary.

ANGEL TORRICO M., R. P. de Chagas comprobado
Ophthalmo-Ganglion
Central. Cochabamba, Bolivia. 1946, July, v. 1, No. 1, 3-10, 3 figs. [13 refs.]

LEISHMANIASIS.

SHORTT, H. E. Transmission of Kala-Azar in India: the Case against the Sandfly—a Reply. *Indian Med. Gaz.* 1946, Aug., v. 81, No. 8, 310-15. [15 refs.]

MALONE, R. H. Transmission of Kala-Azar. [Correspondence.] *Ibid.* 333.

In an earlier paper MALONE and BROOKS [this *Bulletin*, 1945, 42, 357] attempted to discredit the view that sandflies transmit kala azar in India and argued that the experimental work which led to the conclusion that *Phlebotomus argentipes* was the actual vector in India was so artificial in its conception that it was without value. In the earlier work they are not well versed in the literature of the subject and have thus been led to advance specious and superficially plausible arguments in support of their contentions. Those interested in the controversy must consult the papers in the original, which take no account of all the evidence incriminating sandflies in the many areas outside India.

C. M. Wenyon.

	897	1553	Acid sulphate compound
<hr/>			
Toxic dose for mice (LD50)			
Intravenous	0.35 mgm	0.75 mgm	0.7 mgm (LD40)
Subcutaneous	1.5 mgm	1.0 mgm	1.5 mgm (LD66)
Sterilization of <i>T. congolense</i> infection			
Intravenous	0.05 mgm	0.25 mgm	0.025 mgm
Subcutaneous	0.1 mgm	0.075 mgm	0.075 mgm (variable)
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It is evident that these drugs are valuable agents for the cure of *T. congolense* infections as had already been indicated by the work of Carmichael and Bell. They can be injected subcutaneously and this route is sometimes more efficacious than the intravenous route. None of them has any preventive action against any of the trypanosomes studied.

Charles Wilcocks

SERRA G. Il problema della tripanosomiasi umana ed animale in A.O.I. [The Problem of Human and Animal Trypanosomiasis in Italian East Africa.] *Attualità Med.* Rome 1940 July-Oct. v. 5 No. 7 10-11 24

ANGEL TORRICO M. R. Nuevos reservorios domesticos de *Schistotrypanum cruzi* [New Domestic Reservoir Hosts of *Trypanosoma cruzi*] *An. Laboratorio Central Cochabamba Bolivia* 1946 July v. 1 No. 1 11-19 2 figs

The author names 35 vertebrate hosts of *T. cruzi* exclusive of man given in a list by TALICE in his book, the *Parasitic Diseases of Man*. When on a visit to Cochabamba the author entered a poor dwelling and caught 364 specimens of *T. infestans* in different stages of growth and found on examination of their faeces 194 (53.2 per cent) positive. Eight of the persons living there were examined but none showed any sign of infection. They kept guinea-pigs as many of the people do, breeding them for the table and examination of these animals proved them to be heavily infected. Triatomata and guinea-pigs obtained from other dwellings confirmed these findings.

H. Harold Scott

ANGEL TORRICO M. R. Hallazgo de *Erythrus mucronatus* infestacion natural de Awichucas de cerro y *Euriotoma sordida* en Cochabamba. [*Erythrus mucronatus* and *Euriotoma sordida* in Cochabamba. Natural Infestation of Bugs in the Hilly District.] *An. Laboratorio Central Cochabamba Bolivia* 1946 July v. 1 No. 1 19-23 3 figs [10 refs]

The author gives a list of seven commonly known vectors of *T. cruzi* in Bolivia namely *T. infestans*, *Euriotoma sordida*, *E. oswaldi*, *E. versicolor*, *Rhodnius pictipes*, *Panstrongylus geniculatus* and *Psammolestes coreodes*.

Examining for these in Magdalena district of Beni the author came across large numbers of *E. sordida*, many of them infested, and also a new species of *Triatoma*, *Erythrus mucronatus*. This brings the Bolivian species of *Triatomas* up to eight in number. He examined several of them but although they were living together with the infected *E. sordida* he could not find any infected among them.

H. Harold Scott

D'ANDURAIN, C. W. Observaciones histopatológicas de *Octodon degus* naturalmente infestados con *Trypanosoma cruzi*. [Histopathological Observations of *Octodon degus*, naturally infected with *T. cruzi*.] *Biológica*. Santiago. 1945, Dec., No. 3, 93-106, 12 figs. [Summary in English by the author.]

"The author communicates the results of a research work on parasite reservoirs of Chagas Disease, carried out in the surroundings of the Mines of Altamira, Domeyko (Province of Atacama, Department of Vallenar Par. 28°50'). These results consist in the finding of three specimens of *Octodon degus* Molina, naturally infested with *Trypanosoma cruzi*, out of 12 specimens examined, and from a total lot of 402 mammals captured. The finding was made by means of xenodiagnosis, and was later confirmed through the discovery of leishmanoid forms of the parasites in the tissue of these rodents.

"The histopathological examination of the lesions shows that they do not differ essentially from those observed in laboratory animals experimentally infected with the parasite. In one of the specimens examined, a nest of flagellate forms of the *T. cruzi* was found imbedded in a cardiac muscular fibre."

Pizzi P., T. Algunos aspectos de la enfermedad de Chagas experimental. Comunicación preliminar. [Some Experimental Aspects of Chagas's Disease. Preliminary Report.] *Biológica*. Santiago. 1945, Dec., No. 3, 53-68, 15 figs. [10 refs.] English summary.

BADÍNEZ S., O. Contribución a la anatomía patológica de la enfermedad de Chagas experimental. [Observations on the Pathological Anatomy of Experimental Chagas's Disease.] *Biológica*. Santiago. 1945, Dec., No. 3, 3-52, 64 figs. [29 refs.] English summary.

ANGEL TORRICO M., R. Primer caso agudo de forma oftalmoganglionar de enfermedad de Chagas comprobado en Bolivia. [The First Confirmed Case of an Acute Ophthalmoganglionic Form of Chagas's Disease in Bolivia.] *An. Laboratorio Central*. Cochabamba, Bolivia. 1946, July, v. 1, No. 1, 3-10, 3 figs. [13 refs.]

LEISHMANIASIS.

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In an earlier paper MALONE and BROOKS [this *Bulletin*, 1945, 42, 357] attempted to discredit the view that sandflies transmit kala azar in India and argued that the experimental work which led to the conclusion that *Phlebotomus* species were the sandfly vectors.

contributions of these writers point by point and show clearly that they are

which take no account of all the evidence incriminating sandflies in the many areas outside India.

C. M. Wenyon.

VAN DYKE H B & GILLHORN A Chemotherapy of Experimental Leishmaniasis *Proc Soc Exper Biol & Med* 1946 Apr v 61 No 4 403-5

With the object of discovering more effective remedies for kala azar 188 new compounds were tested in Syrian hamsters infected with a Sudan strain of *Leishmanu donovani*. The drugs were administered intraperitoneally either in solution or in suspensions in 2 per cent gum acacia. The action was controlled by liver puncture after the hamsters had received six daily injections of the maximum tolerated dose. As controls untreated hamsters and hamsters treated with the diethylamine ethanol of sodium antimony gluconate (Stibanose) were similarly observed. In no case did any one of the 188 compounds which included 16 trivalent and 14 quinquivalent antimonials prove itself to be superior to the control drugs sodium antimony gluconate Neostam or Neostibosan
C M Henyon

MESSINI M Azione dell'italchina in un caso di leishmaniosi cutanea osservato in Provincia di Roma [Action of "Italchina" on a Case of Cutaneous Leishmaniasis seen in Rome] *Attualità Med Rome* 1940 Jul-Oct v 5 Nos 7/10 131-4 [12 refs]

FEVERS OF THE TYPHUS GROUP

HEILIG R Typhus in Rajputana *Indian Med Gaz* 1946 Oct v 81 No 10 399-400 2 figs on 1 pl

An account of a case of uncertain transmission

CODELLONCINI E Sulle agglutinine della saliva nel tifo esantematico [Agglutinins in the Saliva in Exanthematic Typhus] *Bol Soc Ital di Med e Igiene Trop* (Sez Entrea) 1946 v 6 No 5 265-72

The serum and the saliva of 80 typhus patients have been examined for agglutination titres against *Proteus* X19 in the Imperial Ethiopian Medical Research Institute. Fifty seven were Ethiopians 23 Europeans. Altogether 725 tests were performed but only 23 gave the same result as the 2700 tests

where the serum titre might be 1/5 120 and that of the saliva only 1/80 in another the serum was 1/600 the saliva nil
H Harold Scott

BERKE Z Inoculation Experiments against Typhus in Afghanistan *Brit Med J* 1946 Dec 21 944-5

During 1943 the author made a study of the C. A. M. I.

considerable

In the course of a series of inoculation tests the following results were obtained

in 73 *Pr. OX2*, and in 33 *Pr. OXK* gave positive responses. The 7 sera that were negative for *Pr. OX19*, but positive for one or both of the other two strains, came from patients whose illness occurred during the month of May or in the autumn.

In May 1937, an outbreak of very severe typhus occurred at Aybak; all the patients reacted with *Pr. OX2*, but not with *Pr. OX19*, *Pr. OXK*, or six other *Proteus* strains from the Lister Institute, London.

The number of sera tested is not stated, and the only further information supplied is that plague had been suspected and that "exanthemata were seen in only a few persons, on the medial side of the thigh." *John W. D. Megaw.*

OSBURN, L. W. Cross-Immunity between South African Epidemic (Louse-borne) Typhus and Murine (Flea-borne) Typhus. *South African J. Med. Sci.* 1946, Nov., v. 11, Nos. 2/3, 73-7. [14 refs.]

BERKOWITZ, A. P. A Method for increasing the Infectivity of Yolk-Sac Cultures of the Rickettsiae of Epidemic and Murine Typhus, and South African Tick-Bite Fever. *South African J. Med. Sci.* 1946, Nov., v. 11, Nos. 2/3, 69-72.

In the course of large-scale preparation of epidemic-typhus yolk-sac vaccines it was found that the yield of rickettsiae was very much greater when the death of the embryo chick was delayed till 10 or 11 days after inoculation than when death occurred about the 6th day.

The delay was brought about by greatly reducing the dose of infecting material as estimated by counting the rickettsiae in smears of yolk-sac suspensions. The technical details of the method are described in the paper.

It is stated that batches of eggs inoculated on the 7th day and harvested 11 days later yield 200 cc. of a strong vaccine for each egg.

The method greatly facilitates the preparation of rickettsial suspensions for agglutination tests; it is also equally applicable to the cultivation of murine rickettsiae, which can be harvested 12 days after inoculation. In the same way cultures of the rickettsiae of South-African tick-bite fever can be harvested eight or nine days after inoculation instead of the usual four or five days, so that a sufficient yield of rickettsiae for preparing agglutinating suspensions is easily obtained. The author suggests that the method may be equally suitable for yolk-sac cultures of viruses.

Craigie's thionin stain is said to be invaluable for the detection of scattered rickettsiae (see *Canadian J. Res. Sect. E.* 1944, v. 22, 89). [The author appears to have obtained greater and more uniform increases in yield than other workers who have reported the enrichment of yolk-sac cultures by reducing the inoculation dose of rickettsiae, for example BENGTON (see this *Bulletin*, 1946, v. 43, 19 and 20.) *John W. D. Megaw.*

SMADAL, J. E., JACKSON, E. B., BENNETT, B. L. & RIGHTS, F. L. A Toxic Substance associated with the Gilliam Strain of *R. orientalis*. *Proc. Soc. Exper. Biol. & Med.* 1946, June, v. 62, No. 2, 138-40. [12 refs.]

The author found a toxin, which was lethal to mice, in yolk-sac cultures of the Gilliam strain of *Rickettsia orientalis* 31st and 36th yolk-sac passages. homologous antisera prepared in r of a homologous antiserum was 1-640 whereas the titres of antisera prepared from other strains of the same organism ranged from zero to 1-40.

The antisera tested against the Gilliam toxin were prepared from the following strains of *R. orientalis* — Karp two wild rat strains Volner, Seerangayee Host 21, and Kostival. All the above antisera had been found capable of pro-

strains of *R. orientalis* were not found toxic to mice John W D Megaw

BELL E J BENNETT B L & WHITMAN L Antigenic Differences between Strains of Scrub Typhus as demonstrated by Cross-Neutralization Tests *Proc Soc Exper Biol & Med* 1946 June 1 62 No 2 134-7 [10 refs.]

The author -
of three strain
isolated from a
caught on a wa
a patient in So

Antisera for each of the three strains were prepared by animal inoculation and were tested for their power of neutralizing the three strains of rickettsiae, the results of the main series of tests are shown in the table

	Neutralizing Index		
	K strain	S strain	H21 strain
K antiserum (rabbit)	27	1.0	0.3
S antiserum (rabbit)	0.9	3.6	1.5
H21 antiserum (guineapig)	2.3	3.7	2.3

K and S antisera effectively neutralized only their homologous strains of infection whereas H21 was active against all the three strains

The possible explanations of the different behaviour of the strains were
t be more com
rains had been
(3) H21 anti

serum was prepared in guineapigs whereas the other two were prepared in rabbits John W D Megaw

BÉNARD R & HERBERAT G Un cas de fièvre boutonneuse (maladie de Conor) [A Case of *Fièvre boutonneuse* (Conor's Disease)] *Bull et Mém Soc Méd Hôpiti de Paris* 1947 Nos 1/2 29-32

WIGHT J F & RABKIN Rachel A Note on Tick-Bite Fever *South African Med J* 1947 Jan 11 1 21 No 1 30-31
Report of a case

FENNER I The Epidemiology of North Queensland Tick Typhus: Natural Mammalian Hosts *Med J Australia* 1946 Nov 9, 1 2, No 19, 666-8

Complement fixation tests were carried out on sera of 111 mammals collected in three localities from one of which five cases of North Queensland tick typhus had been reported (see the *Bulletin* 1947 1 204)

the strains of
v 44 204]

Details are given of the number of animals captured in each locality, and of the ectoparasites found on the animals of each species.

Sera of eight animals reacted at titres of 1-4 or over, and five of these were collected in the rain-forest area where cases of the disease had occurred. The reacting animals were:—two among 42 Johnstone's opossums (*Trichosurus vulpecula johnstonii*); two among 11 rufous rat-kangaroos (*Aepyprymnus rufescens*); two among 32 short-nosed bandicoots (*Isodon obesulus*); one among 10 Atherton uromys (*Uromys sherrini*); and one among 5 long-nosed bandicoots (*Perameles nasuta*).

On five of the reacting animals *Ixodes holocyclus* ticks were found; on two others *Haemophysalis humerosa* were found; on the remaining reactor no ticks were found.

Various species of fleas and mites were detected on many of the animals; among the eight reactors, four were infested by fleas of three species, and six harboured mites of four species.

Suspensions of pools of ticks from seven of the reacting animals and from 28 others were inoculated intraperitoneally into guineapigs, but the results were negative.

The presumed vector, *Ixodes holocyclus*, and most of the animals assumed to have been infected, are stated to have a wide range of distribution in eastern Australia.

John W. D. Megaw.

ROTEBURG, S. S. [Prolonged Attacks of Fever of Obscure Origin.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 2, 37-44, 2 figs. [In Russian.]

The author describes cases of a disease of obscure nature encountered in Central Asia and characterized by intermittent paroxysms of fever of short duration with apyrexial intervals of different length, the temperature rising to 39-40.5°C. The course of the disease was benign, its duration sometimes exceeding one year. The paroxysms were accompanied by neutrophil leucocytosis, and in a few cases by enlargement of the spleen and liver. Neither malaria parasites nor spirochaetes were detected in the blood of the patients. Burnet's and Wright's reactions were negative. Inoculation of guineapigs and mice with the blood of the patients produced no infection. Treatment with sulphidine, streptocide, urotropine, and with antimalarial drugs had no effect.

While malaria, tick-borne relapsing fever and brucellosis could be entirely excluded, there remains the remote possibility of the disease representing Volhynian fever with an atypical course and manifestations. C. A. Hoare.

PETRIAEV, E. D. [Tick Fever in the Transbaikalian Region.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 2, 84-5. [In Russian.]

The author records the occurrence in the Transbaikalian region of tick-borne fever of a type previously reported from other parts of Soviet Asia. The vector proved to be the tick *Dermacentor nuttalli*, wild specimens of which were found to be naturally infected, as shown by experimental infection of guineapigs. The disease is first manifested 4-5 days after the patient has been bitten by a tick. At the site of the bite there appears a small necrotic spot surrounded by infiltrated tissue. The patient complains of weakness, chill and headache. By the third day the temperature rises to 40°C., after which it gradually drops until by the 8th-10th day it is normal. On the 4th-6th day the whole body, including the palms of the hands and face, becomes covered with a roseolar-papular rash which persists for 6-8 days. After its disappearance, there remain

faintly pigmented spots on the skin. The spleen and liver are not enlarged. During the first days of the disease there is leucocytosis (9 000-12 000 per cu mm) and moderate lymphopenia.

The Weil-Felix reaction remains negative during the entire febrile period (first 8-10 days of the disease) but by the 11th-14th day of the disease when the temperature is normal the reaction with *Proteus OX19* is positive in titres of 1:200-1:400. On the 10th and 16th days of convalescence the titre of agglutinins reaches 1:3200-1:6400 and on the 42nd day it is 1:800. The

Typhus Fever

C. A. Hoare

YELLOW FEVER

HADDOW A. J. GILLET J. D. & HIGHTON R. B. The Mosquitoes of Bwamba County, Uganda. V. The Vertical Distribution and Biting-Cycle of Mosquitoes in Rain Forest, with further Observations on Microclimate. *Bull. Entom. Res.* 1947 Jan., 37 Pt. 3, 301-30. 2 pls. & 11 figs. 14 refs.

Haddow and those who work with him continue to publish studies on the mosquitoes of an area of rain forest in Uganda close to the Congo border. The yellow fever virus has been isolated in this area from a human case and from *Aedes simpsoni*.

Within recent years the virus has been isolated more than once from mosquitoes under circumstances which suggest that it has been derived from some animal other than human beings and immunity to yellow fever has been demonstrated in a high proportion of monkeys of several species but not in other wild mammals. It is found that some of the monkeys which live in the tree tops and rarely come to the ground including a species of *Colobus* have this immunity though they seem to have no contact with man or with *Aed. simpsoni*.

Transmission might be occurring in the forest through the bite of mosquitoes from platforms at 5 ft. This was carried out in an isolated patch of primary rain forest which had an area of about one square mile.

acting as bait for the mosquitoes. Forty species of mosquitoes including several new to science were captured. They were sorted by species and other groups and 46 000 of them sent to the laboratory at Entebbe where they were inoculated into rhesus monkeys to see whether the virus was in the mosquitoes. The virus was recovered once only from a batch of *Aedes* of twelve species mixed among these species was *Aed. africanus* which is a known vector in the laboratory and is under suspicion.

In the present paper the authors analyse an enormous amount of fact about the level in the forest at which different mosquitoes occur, the time of day or night at which they bite and the abundance in the rains and dry season.

The reader notes that *Anopheles funestus* is not common though it has been caught at all levels from the ground upwards. It is thought that it breeds in

the swamps outside the forest. *Anopheles gambiae* occurred in numbers which astonished the authors, who were familiar with it in its more ordinary haunts. Some 30,000 individuals were caught during forty day and night catches, and constituted 93 per cent. of all the mosquitoes. This insect was commonest at ground level, but occurred on all the platforms, both in the dry and the wet season. Almost half the bites took place between 2 and 6 a.m. with a peak just before dawn. The author relates this to the fact that temperature falls regularly through the night, though relative humidity remains nearly constant during that period. A small number of individuals were found biting at any time of the day in forest. The abundance of this insect in a place which is generally without human inhabitants is so remarkable that a critical examination has been made of adults and larvae: they are not found to differ in any respect from normal *gambiae*.

The species of *Aedes* showed a great diversity of habit. Some are ground-haunting, others (among them the sub-genus *Stegomyia*) live higher up or in the tree-tops, and these show a very great reduction in the dry season, presumably because they breed in little places, such as rot holes, which tend to dry up in the absence of frequent rain. Of the arboreal Culicines, *Aed. africanus* was found to be the most numerous. It was most abundant at 50 to 60 ft. from the ground and bit in the period from 6 to 10 p.m., with an extremely well-marked peak one hour after sunset.

Rather similar notes are given about several species of *Taeniorhynchus* and *Eretmopodites*.

The authors have given much time to recording temperature and relative humidity at all levels in the forest. Throughout the twenty-four hours these elements of climate show little difference between ground level and 16 feet. At 30 ft., and still more at higher levels, temperature is higher than at the ground, especially at mid-day. There is a corresponding lowering of relative humidity. A small series of readings of light, recorded on an arbitrary scale, were also made. It is not at present possible to find any convincing relation between these observations on climate and the distribution or activities of the mosquitoes. The subject appears to be one for testing in the laboratory, where it would be possible to change any of these conditions at will and independently of the others.

P. A. Buxton.

HOFFMAN, W. H. El tratamiento precoz de la fiebre amarilla. [Early Treatment of Yellow Fever.] *Africa Méd.* Lisbon. 1946, May-June, v. 12, Nos. 5/6, 99-107.

By "early" the author implies both "timely" in the disease itself and "prophylactic" in endemic areas of yellow fever. Having heard of the work of BAY, BANFI and TANURI (*Semana Médica*, 1942, 593) in the Argentine on the protection of dogs from the effects of chloroform on the liver by administration of vitamin K, or its synthetic analogue *Synkarite Roche*, and noting that in yellow fever the liver destruction is so marked a feature, he suggests the use of this vitamin or its analogue for early treatment of patients, that is, in the first two or three days of the disease to obviate the fatal issue, and also prophylactically in non-immunized persons.

regarding dosage.
of yellow fever in Cuba
been intimately connected with yellow fever research and progress in Cuba since the days of Finlay and Guiteras.

H. Harold Scott.

DENGUE AND ALLIED FEVERS

MACKERRAS I. M. Transmission of Dengue Fever by *Aedes (Stegomyia) scutellaris* Walk. in New Guinea. *Trans Roy Soc Trop Med & Hyg* 1946 Dec 1 40 No 3 297-312 5 figs 13 refs¹

The author shows that dengue may be transmitted by a forest living mosquito in remote areas in New Guinea.

Classical dengue is familiar to Australian writers: it occurs in settled areas in tropical Australia and in parts in inland areas further north such as Port Moresby New Guinea. During the war period a very similar disease appeared among troops in jungle areas in several parts of New Guinea. *Aedes aegypti* could not be found nor *Aedes albopictus* (a proved vector in Formosa, Sumatra and the Philippines). When an outbreak occurred in jungle areas on the south side of New Guinea *Aedes furcifer* was investigated with negative results. A second epidemic on the north coast near Lae provided an opportunity to test *Aedes scutellaris* and other culicines. The mosquitoes were caught as adults (or bred in a small number of cases) and sorted into cages by species. The flies in each cage were then fed more than once on different men suffering from the disease and then flown to Sydney to be tested on volunteers. *A. scutellaris* transmitted the infection to three men and it was passed on to other volunteers all of whom showed typical symptoms. The original three were then shown to be immune to inoculation of infected blood. The clinical observations with temperature charts are given in some detail and maintain the author's view that the disease was correctly diagnosed as dengue.

Other mosquitoes (*Anopheles* spp. etc.) were tested in a similar way. The material was less abundant and the number of bites given in Australia not very high. Transmission did not result.

The authors point out that the incrimination of *Aed. scutellaris* serves to explain the severe outbreak on the north coast of New Guinea where that insect was abundant. They admit that their findings while settling one question raise another: why is dengue unknown in wide areas in Melanesia and Polynesia? Is it (as a few unpublished facts suggest) that some of the local varieties of this widely spread mosquito are not good transmitters though they bite man so freely? The cases of dengue in rural areas not far from Port Moresby also remain unexplained for the authors failed to find *Aed. scutellaris* there.

As the mosquitoes were given more than one infecting meal the period of development of the virus in the insect is not known. It is likely to be 13 to 19 days longer than has been recorded in other mosquitoes [temperature not stated].

Aed. scutellaris breeds in rain water in empty coconut shells, tree holes and forks, large fallen leaves and old utensils choosing water which is not heavily contaminated. The adults do not fly far. They enter tents to feed but do not rest in them. The biting period is generally restricted to a period just after dawn and at sundown. The insect is not deterred by the use of DDT in places cutting grass and scrub. The use of DDT may be found capable of controlling the insect in some areas.

A. A. DUTTON

KOPROVNIK Hilary & Cox H. R. Adaptation of Colorado Tick Fever Virus to Mouse and Developing Chick Embryo. *Proc Soc Exper Biol & Med* 1946 June 1 62 No 2 320-22

The author succeeded in infecting dba (dilute brown agouti) mice by the intracerebral route with serum from a hamster infected with the virus of

Colorado tick fever. The serum was obtained from Dr. Florio who had already maintained the virus in hamsters through 30 passages [see this *Bulletin*, 1945, v. 42, 118].

Successive passages were made from brain to brain in dba and Swiss mice and there was a considerable increase in virulence so that by the sixth passage all the inoculated animals died. The chief concentration of the virus was in the brain and spinal cord, but the heart, spleen, lungs and blood, also contained the virus.

Identification of the virus was effected by neutralization tests carried out on human, hamster, and mouse antisera, of which very small doses mixed with heavily infected brain substance protected mice from fatal infection by the intracerebral route.

A unit dose of immune human serum from a patient who had been attacked three years previously was found capable of neutralizing 1,349 LD₅₀ doses of the virus, and a corresponding dose of hamster immune serum neutralized 525 LD₅₀ doses of the virus.

Up to the time of writing 23 consecutive brain-to-brain passages have been made. With material from the brain of a mouse of the 12th passage yolk sacs were inoculated and 12 yolk-sac passages have been carried out.

John W. D. Megaw.

GOSWELL, G. A Further Report of an Epidemic of Acute Polyarthrits, *Med. J. Australia*. 1946. Dec. 21, v. 2, No. 25, 861-3.

PLAGUE.

MACCHIAVELLO, A. A Focus of Sylvatic Plague on the Peruvian-Ecuadorian Frontier, *Science*. 1946, Dec. 6, 522.

In South America, hitherto, true sylvatic plague appears to have been reported only from Argentina [DE LA BARRERA, this *Bulletin*, 1940, v. 37, 423]. It has also been believed up to now that plague on the Peru-Ecuador frontier is strictly rural, but in May 1946, extensive epizootics began at both sides of the frontier.

The author's investigations were made in the Encuentros zone of Peru, south from the Ecuadorian border. The country is mountainous with small permanent rivers.

The principal focus of sylvatic plague was in the mountains, La Mesa and Cortezo, where vegetation is dense and the climate is continental. Corn is cultivated on the mountains in small scattered fields, cleared for the purpose.

The author designates this outbreak as sylvatic plague on the following grounds—

1. The absence of domestic rats and their fleas, which alone transmit plague in the rest of the country.
2. The sparse population, with scattered dwellings and absence of significant domestic factors: yet 19 human cases of bubonic plague occurred there, but nearly all the patients were shown to have been infected in the mountain cornfields during the harvest.
3. An intense epizootic among squirrels and native field rats inhabiting the rocks and wooded areas on the slopes and mountain heights.
4. The presence of plague infection in 8 squirrels and 5 dead rats in the wooded areas bordering the cornfields.

5 Infestation of these animals by many mites ticks lice and fleas all the last named being *Rhopalosyllus* of possibly more than one species These

which (with their ectoparasites) are being classified None of the species so far identified has been involved in plague elsewhere in Peru

GIRARD G L association pneumocoque bacille de Yersin in vivo et in vitro The Association of the Pneumococcus and the Plague Bacillus]
Ann Inst Pasteur 1946 Sept Oct v 72 Nos 9/10 708-18

The conjunction of the pneumococcus with the plague bacillus in various

diagnosis of plague pneumonia It is here that the inhibitory or antibiotic

Conditions must be arranged to favour growth and manifestation of *P. pestis* and these are (1) to incubate cultures at 20°C to 26°C and not at 26°C to 34°C (2) to use the guinea pig for inoculation of or scarification with the test material instead of the pneumococcus sensitive mouse

There is some evidence to show that the pneumococcus may exert an anti

plague The incubation however may be prolonged probably by pneumococcus action in the case of primary plague pneumonia In Madagascar the authorities have accordingly fixed a limit of 10 days quarantine detention for contacts as their statutory minimum Plague pneumonia is brought about by the plague bacillus purely and cannot be regarded as either initiated or promoted by the pneumococcus
W F Harty

SHANANNA D & HEDGE K V Some Clinical Impressions of a Plague Epidemic
Indian Med Gaz. 1946 Oct v 86 No 10 432-3

An account of 26 patients in Saklaspur (Mysore) treated with sulphadiazine 20 recovered

GRASSET E Control of Plague by means of Live Avirulent Plague Vaccine in Southern Africa (1941-44) Trans Roy Soc Trop Med & Hyg 1946 Dec v 40 No 3 275-94 [11 refs]

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a 1

High Veld north westward through the Kalahari desert to Bechuanaland South West Africa and Angola

Vigorous measures have been taken to apply vaccine-prophylaxis and to collect data during human plague outbreaks. The vaccine, of K/120 South Africa and E V Madagascar strains, was a live suspension in concentration of 1,000 million organisms per cc., given subcutaneously, in a dose of 1 cc. by single injection. Experiments in dehydration of the vaccine at low temperatures by means of the lyophile process showed storage capabilities up to 2 years with "only little attenuation in the antigenic properties."

As a method of mass immunization carried out to a total of 40,000 individual doses, the vaccine proved eminently satisfactory inasmuch as the reactions were mild. Fourteen outbreaks of plague have been investigated and out of one total of 24,000 persons immunized there occurred only seven pneumonic, seven bubonic and one septicaemic case of plague. The last case recovered. Protection from the immunization is claimed to be effective by the 5th day and to be maximum by the 10th day after inoculation.

W. F. Harvey.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

SHUTE, D. Liver Damage in Amoebiasis. *Brit. Med. J.* 1947, Feb. 1, 172-5.
[30 refs.]

Despite the close connexion between amoebic dysentery and hepatic disease there have been few attempts at investigating the liver condition other than by clinical methods.

synthesis, the Takata-
esent investigation is
test (C.C.F.T.) which
seemed the most promising to apply to this problem and which is stated to be the most sensitive means of demonstrating disease of the liver parenchyma.

The patients selected were all Europeans; Asiatics were excluded on account

by demonstration
eces or in material
obtained by sigmoidoscopy or by proctoscopy.

The C.C.F.T. was done on each patient's serum directly the diagnosis was made, approximately half-way through the course of anti-amoebic treatment and on its completion.

After 14 days' sick leave, the patients returned to hospital for test of cure and during this period the final C.C.F.T. was performed.

The scheme of treatment was the routine course advised by ADAMS at the Liverpool School of Tropical Medicine. Hanger's test was done (1) before the first dose of emetine hydrochloride, (2) between the 9th and 11th days of the sterilizing course, (3) within two days of completion of the course, and (4) on return from sick leave. On clinical grounds, the cases were divided into four groups:—(1) Acute amoebic dysentery, (2) Chronic amoebic colitis, (3) amoebiasis presenting with unusual symptoms, (4) amoebic hepatitis. Cephalin was extracted from sheep brain and made up with cholesterol in ether. The technique of Hanger was followed, except that the final readings for the degree of flocculation were made after a 24 hours' interval, as DICK (1945) has stated that a considerable proportion of normal sera will cause some flocculation after 48 hours.

Normal controls were included as a routine with every batch of sera from amoebiasis cases.

It seemed possible that any liver disease demonstrable in cases of intestinal amoebiasis may be due to secondary bacterial invaders and their toxins. In a series of 73 cases of amoebiasis (excluding those proved to have hepatic

the groups. The symptomatology and physical signs did not appear to afford any indication of the cases in which it was possible to anticipate hepatic damage.

Institution of suitable anti-amoebic therapy produced a rapid recovery of the liver as indicated by the C C F T.

A very small series of hepatic amoebiasis investigated did not justify attempts to draw any conclusions.

The actual pathological changes present in the liver are probably generalized increase of portal connective tissue, lymphocytic infiltration and degenerative changes.

P. Manson Bahr

CHALDHURI R. N. & CHAKRAVARTY H. A Case of Carcinoma of the Colon with Amoebic Infection. *India Med Ga* 1946 Oct. v. 86 No 10 422-3 3 figs on 1 pl.

BLANC F. & SIGUIER F. Les facteurs de gravité de rechute de chronicité et d'échecs thérapeutiques de l'amibiase en milieu tropical. [The Factors of Gravity, Relapse, Chronicity and Therapeutic Failures in Amoebiasis in the Tropics]. *Bull et Mém Soc Méd Hôp de Paris* 1946 Nos 26, 27 & 28 476-7.

RAIL G. A. A Comparative Study of the Therapeutic Effects of some of the Drugs used in the Treatment of Amoebic Dysentery. *J Trop Med & Hyg* 1947 Jan. v. 50 No 1 3-12.

The treatments used for purposes of comparison were six in number and fifty cases were included in each series.

Series I Emetine hydrochloride gr. 1 injections for eight days, four days rest and then gr. 1 daily for a further four days. Total dosage 12 gr. Carbarsone 0.25 gm daily for two days after treatment for amoebiasis.

treatment for comparison.

Series II Kurchi bismuth iodide 10 gr. for ten days. Carbarsone 0.25 gm for ten days. The two given concurrently.

Series III Enterovioform 0.5 gm. for twelve days. Carbarsone 0.25 gm for ten days. The latter given concurrently with the last ten days of enterovioform.

Series IV Emetine and carbarsone as in treatment I. Sulphapyridine 2 gm. *statim* and then 1 gm. four hourly for a total of 13 gm. given on the first two days of emetine.

This latter addition was decided upon when it was judged that some secondary

Cases in each series were divided into :—

(1) Fresh injections.

(2) Relapsed cases—all who had had an attack of amoebic dysentery within the last six months.

The diagnosis was based on the finding of vegetative forms of *Entamoeba histolytica* in the faeces or by sigmoidoscopic swab. Cysts alone were not taken as proof of amoebic infection.

The criteria on which conclusions were based were arranged under three

Faeces were examined on six days following treatment, and again on the 19th, 20th and 21st days. It is acknowledged that the 21-day period is very short.

Results.

Series I (Emetine and carbarsone—18 days). No encysted forms of *E. histolytica* were observed in any of the 50 cases following treatment: probably this was due to carbarsone. It is concluded that this treatment is effective in removing symptoms and healing intestinal lesions, but recurrences took place in 18 per cent. within 21 days.

Series II (Kurchi bismuth iodide and carbarsone—10 days). All symptoms, some severe, subsided within four days which raised hopes as to the therapeutic value of this combination, but the effect was short-lived. Within six days, in four cases, diarrhoea with blood and mucus containing vegetative *E. histolytica*, supervened. Although from the sigmoidoscopic aspect the treatment appeared to have been extremely beneficial, the amoebicidal action was low and the total relapse rate was 48 per cent.

Series III (Enterovioform and carbarsone—12 days). In 13 out of 33 cases, inflammatory lesions in the rectal mucosa were still present at the end of the course. It was concluded that this method is of some value in the acute stage, but of little use in the chronic.

Series IV (Emetine and Carbarsone with sulphapyridine—18 days).

Sigmoidoscopy revealed a diminution of the "inflammation cases", but in two the ulceration persisted throughout treatment. As compared with Series I there was a marked reduction in the numbers with mucosal inflammation and this was ascribed to sulphapyridine.

Series V (Combined treatment—10 days). In one case only were encysted forms found on completion of treatment: sigmoidoscopic appearances were normal and stools negative at the end of 21 days. Healing of the ulcers was less rapid than that observed after emetine and carbarsone.

It is concluded that, apart from the healing of ulcers, this combination is superior to that of emetine and carbarsone in the production of a 21-day cure.

Series VI (Emetine—12 days and Chiniofon during the last 10 days). It was concluded that this treatment is as effective as that of emetine and carbarsone in the alleviation of symptoms and in the production of intestinal healing.

It appeared to the author that those drugs containing emetine, whether in the form of E.B.I. or the hydrochloride, are superior in amoebicidal action to those which do not. This fact, in combination with the undoubted value of chiniofon by retention enemata, has induced him to devise a treatment which combines concentration with safety :—

(1) Emetine gr. 1 daily for ten days.

(2) E.B.I. and chiniofon from 6th to 15th days, as in Series V.

(3) Sulphapyridine 2 gm. *statim*, and then 1 gm. four-hourly to a total of 13 gm. commencing on the first day of emetine. Over this period the patient's diet should be of medium caloric value and low residue. From the sixth to

fifteenth days strict confinement to bed is insisted upon. The total dosage of *emetine* (including the E B I) is 14½ gr

of military service are fully appreciated.]

P Manson Bahr

BLANC F & SIGUIER F. Le traitement des amibiases chroniques et à rechutes par l'association pénicilline émetine sulfamides. Premiers essais thérapeutiques [Treatment of Chronic and Relapsing Amoebiasis with a combination of Penicillin, Emetine and Sulphonamides] *Bull et Mém Soc Méd Hôp de Paris* 1946 Nos 26 27 & 28 471-5

A brief record of the and secondary colitis was in addition. The dramatic

A R D Adams

KNOLL Elta W & HOWELL Katharine M. In Vitro Effect of Penicillin on *Endamoeba histolytica*. *Amer Pathology* 1946 Dec v 42 No 6 594-7

Little or no effect was found on either trophozoites or cysts

KESSEL J F & MOORE F J with the technical assistance of F M KAPLAN & R SCHIRESON. Emergency Sterilization of Drinking Water with Heteropolar Cationic Antiseptics. I Effectiveness against Cysts of *Endamoeba histolytica*. *Amer J Trop Med* 1946 May v 26 No 3 345-50 [16 refs]

The authors have tested a number of heteropolar cationic antiseptics or as they are sometimes termed synthetic cationic detergents for their powers of destroying cysts of *Endamoeba histolytica* in drinking water. The tests were carried out by suspending cysts (10 000 per cc) in varying dilutions of the antiseptics for 10 minutes at a temperature of 20°C. The cysts were then washed and inoculated to a culture medium. If amoeba did not develop during the course of five days the cysts were regarded as killed. At the same time oral toxicity tests were carried out on mice. Three of the substances tested were effective in dilutions of over 1/80 000 the safest being n hexadecyl dimethyl 2 hydroxyethyl ammonium chloride. A few of the more effective were sampled for taste and were found to be slightly medicinal and astringent. Further studies are being undertaken with the object of discovering methods for the removal of excess of the substances from water after sterilization has been completed. It has also to be determined whether signs of toxicity would be noted when they were consumed over long periods. C M Henyon

WATSON I M. Studies on the Microbiology of a Little-Known Part III Coprophilia. *Aug v 37 Nos 3/4*

In this paper the author describes the growth of a little-known

this ciliate which is an occasional inhabitant of tap water and has been not regarded by SCHAUDINN as a new many others who followed him. The ciliate grows readily in normal faeces whether diluted or not. It was remarkable that it failed to grow in

undiluted faeces of soft or liquid consistency from various cases of intestinal disorder. Frequently dilution of such faeces failed to give a suitable medium for growth. The chief reason for the failure was the high osmotic pressure in the liquid stools and the presence of bile salts, which are highly toxic to the ciliate. Two other factors which hinder growth are the presence of drugs and contamination with urine. Experiments in mice showed that the cysts of the ciliate were incapable of passing uninjured through the alimentary canal. In no case was it possible to obtain cultures from the mice. C. M. Wenyon.

D'IGNAZIO, C. Sulle parassitosi intestinali di Etiopia. [The Intestinal Parasites of Ethiopia.] *Bol. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1946, v. 6, No. 5, 227-36.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

DE MEILLON, B. & GOLBERG, L. Development of *Ornithodoros moubata* on Normal and Thiamin-deficient Rats. [Correspondence.] *Nature*. 1947, Feb. 1, 171.

Little work has so far been published on the effect of feeding blood-sucking arthropods on mammals whose own diet has been abnormally deficient in vitamins and other factors. The authors of this communication previously showed that bed bugs (*Cimex lectularius*) and nymphal ticks were adversely affected when fed on rats reared on a diet deficient in thiamin [see *Bulletin of Hygiene*, 1946, v. 21, 838]. They have now shown that whereas *Ornithodoros moubata* has four moults before reaching maturity when fed on normal rats, it has five when fed on thiamin-deficient individuals. The period between moults is also prolonged in the latter case, so that the development takes some 80 days, instead of the 41 days taken when normal rats are used. The larger nymphs show some reluctance to feed on the deficient rats. Kenneth Mellanby.

CALERO, C. Relapsing Fever on the Isthmus of Panama. Report of 106 Cases. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 761-9. [21 refs.]

The author discusses the clinical aspect of relapsing fever on the Isthmus of Panama, based on the records of 34 patients at the Santo Tomas Hospital, Panama City, from 1927-1944, and of 72 patients from Gorgas Hospital, on the Canal Zone, from 1907 to 1944 inclusive.

The aetiological agent, *Spirochaeta neotropicalis*, a variety of *S. recurrentis*, is usually transmitted by *Ornithodoros venezuelensis* but also by *O. talaje*, from animals to man. The incidence of the disease is very low, not more than 0.11 per 1,000 in the Republic of Panama, and 0.05 in the Canal Zone. The incidence of relapsing fever is 0.05 in the Republic of Panama, and 0.05 in the Canal Zone.

described in Texas [see this *Bulletin*, 1936, v. 33, 347]. The prognosis is good, no deaths having been reported. Treatment with an initial dose of 0.3 gm. of neosalvarsan or neoarsphenamine, injected intravenously, followed 24-48 hours later by 0.45 gm. of the same drug, gives satisfactory results. E. Hindle.

LEBON, J., CHOUSSAT, H. & DUBOUCHER, G. Sur quelques formes nerveuses de la fièvre récurrente cosmopolite. [Some Nervous Forms of Cosmopolitan Relapsing Fever.] *Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1946, Nos. 26, 27 & 28, 448-50.

D'IGNAZIO C & CODELEONCINI E Atipie della febbre ricorrente dello Scioa [Atypical Relapsing Fever in Scioa.] *Bol Soc Ital di Med e Igiene Trop* (sez Eritrea) 1946 v 6 No 5 237-42

The authors mention in general terms—no cases are detailed—certain unusual forms of relapsing fever which have come under their observation in Addis Ababa. Six such atypical forms are spoken of (1) With severe hepatic symptoms enlarged liver subicterus with much biliary vomiting diffuse tremors and haemorrhages (see below) and rarely coma and hyperpyrexia (2) Haemorrhagic form with epistaxis haematemesis intestinal renal cerebral and cutaneous (petechial) haemorrhages often associated with the hepatic form Both these are more common in the natives than in Europeans (3) Pseudo-dysenteric with repeated and uncontrollable vomiting and mucous and muco-sanguinolent stools colic and perhaps tene mus (4) Pulmonary with a picture typically like that of lobar pneumonia They have seen 18 such cases between 1937 and 1945 (5) Meningo-encephalitic (6) Pseudo-rheumatic with pain in muscles joints and bones but failing to respond to the usual anti rheumatic remedies

As regards treatment the rheumatic form responds to bismuth and arsenic in the pulmonary form much is hoped for from penicillin in the haemorrhagic form vitamin K has proved beneficial In the early stages of the disease they

WYLIE J A H The Relative Importance of the Renal and Hepatic Lesions in Experimental Leptospirosis Icterohaemorrhagica *J Path & Bact* 1946 July v 58 No 3 351-8 6 figs on 2 pls [28 refs]

Routine autopsies of guineapigs dying from a strain of *Leptospira ictero-haemorrhagica* (isolated from the kidneys of rats infesting a P O W camp in which there had been two established cases of Weil's disease) revealed a

time or the progress of renal failure All animals dying from the leptospirosis developed severe kidney lesions which showed histologically severe engorgement of the glomeruli and tubular damage similar to that described in incompatible blood transfusion traumatic anuria and blackwater fever The author considers that the death of the guineapigs inoculated with his strain of *Leptospira* resulted from renal failure The latter is probably an example of the syndrome of renal anoxia MAEGRAITH *et al* this *Bulletin* 1945 v 42 968¹

B G Macgrath

WILLIAMS M H C Treatment of Renal Failure in Weil's Disease by Spinal Anaesthesia. *Lancet* 1947 Jan 18 100-101 2 figs

The author reviews the evidence suggesting that renal failure in Weil's disease and certain other conditions may result from renal anoxia arising from ischaemia of the renal cortex [MAEGRAITH HAVARD & PARSONS this *Bulletin* 1945 v 42 968] If the reduction in glomerular flow were the result of vascular spasm paralysis of the sympathetic nerves should be useful in the treatment of such conditions Splanchnic block has been tried with success in the treatment of anuria following blood transfusion and abortion ROBERTSON [this *Bulletin* 1947 v 44 428] treated three cases of anuria in Weil's disease with high spinal anaesthesia and reported recovery in one case

Dr. Williams suggests that sympathetic paralysis should be started in Weil's disease in the oliguric stage, before anuria has developed. He describes a case in which such a procedure was successful.

The patient, aged 61, was admitted to hospital suffering from Weil's disease. He was given a pint of plasma intravenously and an intramuscular injection of methedrine 30 mgm. The plasma was followed by 4.3 per cent. sodium sulphate by slow drip and 0.5 mgm. "Digoxin" orally. On the day following admission, catheterization produced 8 oz. of urine which was acid, contained albumin, bile, leucocytes, some red cells and occasional casts. Unfortunately, the exact amounts of urine passed subsequent to this and prior to anaesthetic treatment were not recorded, but the patient was "still secreting small quantities." The case note continues: "At 6 p.m. there had been no increase of urinary output so high spinal anaesthesia (16 cc. of light 'Nupercaine', the patient sitting up for 55 sec.) was administered producing skin anaesthesia up to the level of D7. By the next morning he had received 105 oz. of fluid and had passed 52 oz. urine." The diuresis continued and after a day's lag the blood urea N (321 mgm. per cent. on admission) fell rapidly, reaching normal limits in about a fortnight. The author points out that spontaneous recovery from anuria in Weil's disease may occasionally take place without active treatment. Nevertheless the "close time relation between the induction of high spinal anaesthesia and the start of urinary secretion" in the case reported indicated that the treatment played some part in the recovery.

[This is an interesting paper. It is a pity that full records of urinary output are not available for the period prior to the induction of spinal anaesthesia. It might be argued also that the other treatment given, e.g., intravenous plasma and sodium sulphate, might have played a part in the production of diuresis. The reviewer believes, however, from his own experience that the latter explanation is extremely unlikely.]

B. G. Macgrath.

YAWS.

HACKETT, C. J. *The Clinical Course of Yaws in Lango, Uganda.* *Trans. Roy. Soc. Trop. Med. & Hyg.* 1946, Dec., v. 40, No. 3, 206-17, 35 figs. on 8 pls., 1 map & 2 diagrams. [20 refs.] Discussion 218-27 [WENYON, C. M.; STANNUS, H. S.; FINDLAY, G. M.; WATTS, J. C.; CHESTERMAN, C. C.; HEWER, T. F.; MURGATROYD, F.; BLOSS, J. F. E.; LEECH, R. B.; HACKETT, C. J. (in reply)].

———. *Incidence of Yaws and of Venereal Diseases in Lango (Uganda).* *Brit. Med. J.* 1947, Jan. 18, 88-90.

The material upon which these two papers are based was collected in 1937-40. They are complementary but overlap to some extent and may be considered together.

One of the main points of interest elicited is the interesting comparison between the incidence of yaws and of syphilis respectively in two areas in Uganda. The incidence of yaws at Lira in Lango district was 13 times that at Masaka in Ganda province, while the incidence of syphilis at Masaka was 16 times that at Lira. At Lira the incidence of yaws was 19 times that of syphilis; at Masaka syphilis was more prevalent than yaws and the incidence of yaws was 1.5 times that of syphilis. Yaws cases formed 20 per cent. of 16,207 at Masaka. In (ii) tables are given showing the annual out-patient attendances for various groups,

lesions Dr Hackett in his summary lays stress upon the following points —

The initial lesion may heal before secondary ones appear or may persist into the secondary stage. All other active lesions apart from a few such as ganglion, hydrarthrosis and goundou which may occur in more than one stage are either secondary or tertiary. In many cases secondary lesions cease to relapse 2 to 3 years after infection. In some cases lesions of the secondary type may develop years after the earliest manifestations of infection have healed while in other cases tertiary lesions may appear within a few years of infection. In many cases there is a more or less symptom free period of years between the healing of the secondary eruption and the development of tertiary lesions. Lesions of these two types are never observed in the same patient at the same time nor is the initial lesion present when tertiary lesions have developed.

The paper at the Royal Society of Tropical Medicine and Hygiene was followed by a discussion to which an important contribution was made by Dr G. M. FINDLAY on yaws in West African populations. *H. S. Stanislaus*

SMITH F. H. Chancro like Jofots in Yaws. *U.S. Nat. Med. Bull.* 1946 Dec. v. 46 No. 17 1837-43 4 figs. [25 refs.]

STUBENBORD W. D. Yaws treated with Penicillin. *U.S. Nat. Med. Bull.* 1946 Dec. v. 46 No. 12 1895-8 2 figs.

Report of a case

LEPROSY

GIVÉS A. R. & POLETTI J. G. La reacción de Mitsuda en los vacunados con BCG. (Posibilidades de la vacunación BCG en la profilaxis de la lepra.) [Mitsuda's Reaction and BCG Vaccination] *Bol. Oficina Sanitaria Panamericana* 1946 Oct. v. 25 No. 10 884-8 [English Summary]

This is an interesting contribution by way of preliminary and is worth following up. FERNANDEZ in 1943 pointed out certain affinities between leprosy and tuberculosis in that positive reactors to tuberculin were positive also to the Mitsuda reaction. From this the idea naturally followed of the possibility of BCG vaccination being tried as a prophylactic against leprosy. The authors examined 31 boys, some of leprosy parents interned in a sanatorium in Paraguay but free from leprosy. Twenty four of them gave positive reactions to tuberculin and some showed infection of the glands by X rays. All were given BCG by multipuncture (Rosenthal's method). In 11 of them the Mitsuda reaction was not known before the BCG was inoculated but afterwards 9 were positive. In the other 20 the Mitsuda reaction was negative but afterwards 16 of them became positive. It is argued that if a positive Mitsuda reaction is a sign of relative immunity to leprosy then the inoculation of BCG may be able to protect in some degree at least against leprosy. [This work was also described in *Hoja Tisiologica* 1945 v. 5 287] *H. Harold Scott*

HELMINTHIASIS.

MEIRA, J. A. Tratamento das verminoses. [The Treatment of Worm Infections.] *Gaz. Clin.* Rio de Janeiro. 1946, May-June, v. 44, Nos. 5/6, 93-121.

OLIVER-GONZÁLEZ, J. The Possible Role of the Guppy, *Lebistes reticulatus*, on the Biological Control of *Schistosomiasis mansoni*. [Correspondence.] *Science*. 1946, Dec. 20, 605.

In Porto Rico, the guppy (*Lebistes reticulatus*) is a fish commonly seen in aquatic regions where the snails *Australorbis glabratus* abound: conversely, when this species of snail is absent, the guppy is usually absent too. Hence it is believed that some element in the snail may constitute an essential food for the guppy.

It was also observed that in certain regions endemic for schistosomiasis, *A. glabratus* could no longer be found, but numerous guppies were seen in the water. When these were studied in laboratory aquaria, they fed actively on egg masses laid by the snails, and also on cercariae shed by them.

Further experiments are being carried out with the object of studying the rôle of the guppy as a "natural enemy" of cercariae-infected snails.

H. J. O'D. Burke-Gaffney.

PINILLA B, C. La distomatosis por *Fasciola hepatica* en el hombre. [*Fasciola hepatica* Infection in Man.] *Semana Méd.* Tomo Cincuentenario 1894-1944, Fasc. 2, 585-97. [Numerous refs.]

An historical and medical review.

BACIGALUPO, J., REV. M. & TOCE, A. Temasis por *Hymenolepis diminuta* en el hombre en la Argentina [*Hymenolepis diminuta* Infection in Man in Argentina.] *Semana Méd.* Tomo Cincuentenario 1894-1944, Fasc. 2, 579-83, 10 figs.

A report of the third case in Argentina.

CANTACUZÈNE, A. & LUPASCO, G. De l'existence d'un important foyer d'ancylostomiase dans les charbonnages d'Anina-Steierdorf. [An Important Focus of Ancylostomiasis in the Mines of Anina-Steierdorf.] *Arch. Roumaines Path. Expér. et Microbiol.* 1942, July-Dec., v. 12, Nos. 3/4, 485-94.

Hitherto there have been very few references to ancylostomiasis in Rumanian literature although isolated reports on individual cases have appeared. However, Drs. IBERER in 1903 (*Munch. med. Woch.*, I, 992) reported on the endemic existence of hookworm in Banat. They found a large number of carriers in the Anina coal mines, namely 96 per cent. of 1,647 subjects examined. Although a quarter of the infected persons had symptoms which necessitated hospitalization, they did not consider that these pathological manifestations were entirely due to hookworm infection.

The present enquiry was undertaken to ascertain the number of persons infected amongst the mining population and to investigate what conditions favoured the development of the parasite and the creation of a focus of ancylostomiasis.

The miners consisted of two groups: one of whole-time experienced miners and the other of temporary recruits from the agricultural districts who worked only in the winter season. The latter returned in the summer to the rural districts and were thus possibly a cause of the spreading of the infection.

In the Anina coal mines, the temperature is about 22°C. in the principal galleries but above this figure in the distant workings. There is frequent

flooding. The miners work in very unhygienic conditions there are no proper sanitary arrangements so that the soil is contaminated with the faeces of the miners most of whom work bare footed. In view of the high temperature the damp conditions the contamination of the soil and the bare footedness of the miners highly favourable conditions exist for the development of *Ancylostoma* larvae for their distribution and for the infection of the miners.

Stools were examined by Willis' concentration method as modified by HUNG,

person it would probably have been higher. It varied in the four different pits of the mine in two pits the figures were 96.1 per cent and 92.3 per cent while in the other two pits they were only 70 per cent and 68.6 per cent.

The results were arranged accordingly to the depth at which the miners were working this showed a slightly higher percentage in the deepest galleries (980 metres) but the difference was scarcely significant.

No quantitative method of counting the eggs was carried out such as that recommended by STOLL [this Bulletin 1923 v. 20: 949-50] but the numbers of eggs per microscopic field were noted and are shown in tabular form. The heaviest infections were in the pit that had the highest percentage of positive cases and the lightest infections in that with the lowest percentage of positive cases.

Many of the miners showed undeniable clinical signs but of a moderate degree. The clinical signs were digestive troubles nausea vomiting pain in the epigastric region and occasionally diarrhoea. Signs of anaemia with paleness of the mucous membranes were not infrequent and a few of the men had dyspnoea on exertion.

Blood examinations were carried out in certain cases only the red cells were reduced to amounts varying from 3.8 million to 1.9 million per cmm and the haemoglobin from 60 per cent to 30 per cent.

Several examinations of the stools of miners families were carried out but in 30 cases no positive stools were found.

L. E. Napier

JOHNSTONE R. D. C. *Lofasis* *Lancet* 1947 Feb 15: 250-53

The main point of interest in this paper lies in the account of personal experiences.

The author became infected with *L. loa* some time between July 1943 and June 1944. In July-August 1944 he noted the gradual onset of a swelling with pitting oedema above the right wrist accompanied by severe neuralgia. This was succeeded by a regular sequence of Calabar swellings. The blood

iceable decrease

adult worm was

short interval

a third. This differed from its predecessors by wandering about for some days. At one time it was coiled in the outer aspect of the upper lid and there formed a small Calabar swelling. The emergence of the filaria from the inner canthus was accompanied by the most acute pain. A fourth was removed from the right eye after wandering around for two weeks. Its extraction was slow, necessitating three lamellae of cocaine which appeared to paralyse it.

Recently there have been no localized Calabar swellings. No microfilariae have been found in the blood throughout. The effect of temperature on the

swellings constitutes an important observation; they were frequent during the hot summer months, but rare in the cold weather. *Philip Manson-Bahr.*

DEFICIENCY DISEASES.

LEWIS, C. F. & MUSSELMAN, Merle M. Observations on Pellagra in American Prisoners of War in the Philippines. *J. Nutrition.* 1946, Nov. 11, v. 32, No. 5, 549-58.

American prisoners of war in the Philippines subsisted on a diet consisting mainly of rice, which provided less than 1,500 calories a day, and was grossly deficient in protein and vitamins. Pellagra broke out after 6 months, and continued to occur throughout the next two years. Eventually almost all the prisoners were affected.

The most severe changes were in the skin. The lesions were more extensive than those usually described in pellagra. They occurred in parts of the body exposed to sunlight, and were aggravated by it. Skin protected by clothing was unaffected, and was sharply demarcated from neighbouring areas of dermatosis. In the affected areas, vesicles and bullae appeared, which often became haemorrhagic and ruptured. This was followed by "weeping", desquamation, and secondary infection. The slightest trauma resulted in ulceration. The tongue was swollen, raw, and red; there was inflammation and ulceration of the buccal mucosa, maceration at the corners of the mouth, and seborrhoeic lesions round the alae nasi, lips, and chin. Dermatitis of the scrotum was present in many cases.

Digestive disturbances were common, but in the presence of amoebic and bacillary dysentery it was not possible to distinguish diarrhoea that was specifically a result of pellagra. Many pellagrins were found to have reduced or absent gastric acidity, and the digestive symptoms were relieved by dilute hydrochloric acid. Frequency of micturition, dysuria, and haematuria were also found.

Many patients presented evidence of neurological lesions. Signs of peripheral neuritis responded to treatment with vitamin B₁. In other cases, there was a spastic paresis with exaggerated reflexes. Mental symptoms were mild, and improved with nicotinic acid, they consisted mainly of irritability, loss of memory, and inability to concentrate. Only a few patients became maniacal or disoriented.

Successful attempts were made to prevent and cure the pellagra by the use of a yeast culture made in the camp. For some months, after the arrival of Red Cross parcels and an increase in the rations issued by the Japanese, there was a substantial rise in the calorie and protein intake. During these months the pellagrins rapidly improved. Severe cases, which did not recover with diet alone, were given nicotinic acid, and a good response was usually obtained with 25-100 mgm. Later, when the Red Cross food was finished and the ration scale was reduced again, nicotinic acid was found to have much less effect in cases of comparable severity. In 1944, a daily issue of one multivitamin capsule, containing 10 mgm. of nicotinic acid, was made to each man; as a result of this, the severity of the pellagra seemed to be reduced, although the incidence remained high, 25-50 per cent. of the prisoners being affected.

[Pellagra appears to have been more common among the American prisoners in the Philippines than among the British or Australian troops in Singapore and Hong Kong. Detailed figures of the food issued are not given in this paper, so that a precise comparison of the diets is not possible.

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PINEDO C CÁNEPA C H & FUKELMAN R Pellagra y colitis ulcerosa [Pellagra and Ulcerative Colitis] *Rev Med Quirug Patol Femenina* 1946 July v 25 No 5 265-8

Report of a case

HERNANDO ORDÓÑEZ J Melanosis de causa desconocida. Carencia nutritiva vida en la altura y trastornos hipofisarios como posible causa [Melanosis of Unknown Origin Malnutrition, Life in the Altitude and Pituitary Trouble as Possible Cause] *An Soc Biol Bogotá* 1946 July v 2 No 4 121-46 Bibliography [Summary in English by the author]

A peculiar form of melanosis is described which was found in Bogota at an altitude of 2 640 meters above sea level in individuals suffering from malnutrition and who have lived for a long time at altitudes between 1 500-2 600

nicotinic acid

The cause of this syndrome may be a hypersecretion of the melanotropic hormone of the pituitary stimulated by altitude or a dietary deficiency of several vitamin or protein factors

GILLMAN J & GILLMAN T The Pathogenesis of Cystidiosis (Hemochromatosis) as evidenced in Malnourished Africans *Gastroenterology* 1947 Jan v 8 No 1 19-23 [28 refs]

HAEMATOLOGY

DAVIS L J Recent Trends in the Treatment of Megaloblastic Anaemias *Glasgow Med J* 1947 Jan v 28 No 1 1 27 2 coloured figs on 2 pls [77 refs]

SULLIVAN C J & BROWN G O Avoidance of Allergy to Liver Extract *J Amer Med Ass* 1947 Jan 18 v 133 No 3 178-9 1 chart

1 A case of macrocytic anemia with organ specific allergy to liver extract is reported

2 Administration of folic acid followed later by that of dried stomach and iron solved the serious problem of persistent allergy to liver extract and resulted in maximal and prolonged maturation of erythrocytes

Additional note The blood values after seven months of continuous medication with the same dosage were as follows red blood cells 4 25 million hemoglobin 12 75 Gm per hundred cubic centimeters and mean corpuscular volume 90 cubic microns

*After I had written this I observed 1 case coming from an altitude of 1 000 meters above sea level

SPIES, T. D. & STONE, R. E. Liver Extract, Folic Acid, and Thymine in Pernicious Anaemia and Subacute Combined Degeneration. *Lancet*. 1947, Feb. 1, 174-6.

The authors have shown, as the result of many years' study, that refined liver products, when injected, produce much more dependable responses than do crude products administered by the mouth.

In order to determine which, if any, of the B-complex vitamins is responsible for the anti-anaemic properties of liver extract the authors have tested many, both singly and in combination, and eventually folic acid was found to produce a definite haemopoietic response in megalocytic anaemia. Later it was demonstrated that 5-methyl nracil (thymine) produced a similar response, though to a lesser degree. The present paper concerns itself with a study of the comparative value of parenteral liver extract, of folic acid and thiamin by the mouth, not only in producing and maintaining satisfactory blood-levels, but in relieving and protecting against neurological disturbances in pernicious anaemia, especially as regards subacute combined degeneration.

It soon became obvious that neurological improvement could not be effected with folic acid. When the disease progressed it was discontinued and 5 cc. of refined liver extract was given daily by intramuscular injection and within 10-12 days there was subjective and objective neurological improvement. Representative case records are cited.

Four patients with addisonian pernicious anaemia were treated with synthetic thymine in doses of 5-7.5 gm. daily by month and this was followed by a satisfactory haemopoietic response, though not so great as with liver or folic acid. Nevertheless increased blood values were maintained throughout the 8 months in which the patients were given 4.5 gm. of thymine daily.

In two patients neurological manifestations progressed rapidly, but regressed on liver-extract therapy.

It is therefore concluded that refined liver extract, administered parenterally in adequate amounts and at suitable intervals, will produce a haematological remission in persons with addisonian pernicious anaemia in relapse, will maintain satisfactory blood-levels and effectively prevent subacute combined degeneration, but if it is not administered regularly, relapses take place and eventually signs and symptoms of degenerative changes in the nervous system appear, moreover adequate liver-extract therapy will reverse such changes if not too pronounced.

BETHELL, F. H., MEYERS, Muriel C., ANDREWS, G. A., SWENDSEID, Marian E., BIRD, O. D. & BROWN, R. A. Metabolic Function of Pteroylglutamic Acid and Its Hexaglutamyl Conjugate. I. Hematologic and Urinary Excretion Studies on Patients with Macrocytic Anemia. *J. Lab. & Clin. Med.* 1947, Jan., v. 32, No. 1, 3-22. [35 refs.]

P. Manson-Bahr.

SWENDSEID, Marian E., BIRD, O. D., BROWN, R. A. & BETHELL, F. H. Metabolic Function of Pteroylglutamic Acid and Its Hexaglutamyl Conjugate. II. Urinary Excretion Studies on Normal Persons. Effect of a Conjugase Inhibitor. *J. Lab. & Clin. Med.* 1947, Jan., v. 32, No. 1, 23-7. [15 refs.]

HAYS, E. E. Effect of Folic Acid upon Primitive Erythrocytes *in vitro*. *Proc. Soc. Exper. Biol. & Med.* 1946, Dec., v. 63, No. 3, 558-60.

BÉNARD, H., RAMBERT, P., CAJDOŠ, A. & VAN DEN BROUCKE. L'acide folique dans le traitement des anémies pernicieuses. [Folic Acid in the Treatment of Severe Anaemias.] *Bull et Mém. Soc. Méd. Hôp. de Paris*. 1946, Nos. 26, 27 & 28, 457-63. [22 refs.]

Report of three successful cases.

VENOMS AND ANTIVENENES

SERCENT Et Scorpions et serum antiscorpionique [Scorpions and Scorpion Antivenene] *Bull Acad Med* 1947 v 131 Nos 1/2 45-9 [Numerous refs.]

In Northern Africa says the author scorpion stings cause more fatalities than do snake bites. As evening approaches they enter dwellings and cling to the walls or hide in clothes. CHAVE in 1939 recorded 400 cases of scorpion sting 15 of them fatal. Snake antivenenes are useless in treatment so in 1935 the author undertook preparation of scorpion antivenene.

There are some 15 species of scorpion in Northern Africa of these the following are the most important *Prionurus australis* and *P. liouvillei* in the eastern plains and the Sahara *P. amoreuxi* and *P. hoggarensis* in the Sahara *Buthus occitanus* in the hilly districts of Tell and the Sahara *Hottentota gentilis* in western Sahara and *Scorpio maurus* generally distributed.

For experiment white mice were the best test animals. It is not feasible to obtain the same results with the same species.

This will re- of six of the above species were determined in white mice of 20 gm weight. They were *P. australis* 1/40 telson *P. amoreuxi* 1/15 *P. hoggarensis* 1/10 *Buthus occitanus* 1/10 *Hottentota gentilis* 1/10 *Scorpio maurus* 7 telsons. Thus *P. australis* is the most potent venom and nearly all fatal cases in man have been due to this. Symptoms usually begin to appear between 10 minutes and 10 hours rarely delayed to 20 and even 24 hours and when death occurs this is usually 2-20 hours after the infliction of the sting one-fifth of the fatal cases between 24 and 30 hours. An infant stung has died in a few minutes. *Buthus occitanus* sting is occasionally fatal in the Algerian littoral area. In some patients the reaction is but slight. This variability is ascribed to the difference in toxicity of the venoms and to differing susceptibilities of the persons stung (the very young and the aged are more susceptible than the normal adult) also of course the scorpion may have expended some of its venoms on someone or something shortly before and the glands therefore be-

ent is used it

some treated by the serum others not. Grave desperate cases have numbered 531 of which 134 were in extremis of this total 472 or nearly 89 per cent were cured. The following are the general rules for dosage (1) In severe or intravenously as ren 30-50 cc (infants he onset of symptoms is delayed do not wait. Late appearance of symptoms may be followed rapidly by death. Also patients should be kept under observation for several hours because after a time the symptoms may return and necessitate further administration of antivenene. (3) Generally speaking the earlier it is given the better after 4 hours the effect is poor but recovery has been seen in patients apparently in extremis 24 hours after infliction of the injury. Failure is usually attributable to one or other of the following causes. Administration too late quantity injected too small surveillance not maintained and the serum in consequence not being repeated in time. [An article of much interest.]

H. Harold Scott

SERGEANT, Et. Sérothérapie antiscorpionique. (Neuvième note.) Observations médicales reçues pendant l'année 1945. [Treatment of Scorpion Sting by Antivenene. (Ninth Note.) Reports received during 1945.] Arch. Inst. Pasteur d'Algérie. 1946, June, v. 24, No. 2, 112-15.

After a brief narration of the serious symptoms resulting from scorpion stings—coma, pulmonary oedema, priapism, marked fall of temperature, even to 35.7°C.—the author stresses again the necessity for giving adequate doses, of injecting large quantities of physiological saline (up to 500 cc.) and of keeping the patient under observation for some hours in case symptoms return. Though the giving of antivenene should not be delayed, if possible, beyond four hours, it may be efficacious even as late as 24 hours after infliction of the injury.

Giving details of recorded cases in 1945, the author states that four patients with grave symptoms who did not receive the antivenene died; of 440 who did receive it, 318 were mild and recovered rapidly, 48 had serious but not alarming symptoms and all recovered, in 74 life was in danger and 13 of these receive special mention. In six, insufficient antiserum was injected, in two it was given late; in one both too late and in too small an amount; in four the symptoms returned and the serum was not repeated.

In summing up, the author refers to the same figures as those given above; 2,209 reports received; of this total, 531 were of those whose lives were considered to be in danger and 134 of them in *extremis*; 472 (88.8 per cent.) were cured.

SERGEANT, Et. Venin de *Scorpio maurus* L. (= *Heterometrus maurus*). [The Venom of *Scorpio maurus*.] Arch. Inst. Pasteur d'Algérie. 1946, Sept.-Dec., v. 24, Nos. 3/4, 301-3 H. Harold Scott.

As the author remarks, there are scorpions and scorpions. Some, such as *Prionurus australis*, are able to kill children, and even adults, by their sting others, such as *Scorpio maurus* have never been known to cause death. Such differences of potency explain the different opinions that have been expressed regarding the danger of scorpion stings, and, no doubt, have delayed the development of specific serotherapy. At the Pasteur Institute of Algeria however, the preparation of serum against the dangerous scorpion venoms is now well established, and over 10,000 ampoules were issued for use during the first 10 months of 1946.

Charles Wilcocks.

DERMATOLOGY AND FUNGUS DISEASES.

SIMONS, R. D. G. P. Studies on Prickly Heat. Miliaria and Sudamina. Reprinted from *Dermatologica*. Basel. 1946, v. 93, No. 3, 172-82, 3 figs. [16 refs.]

There is great divergence of opinion on the aetiology, genesis and pathology of prickly heat.

"Briefly the main theories are that:—

"(1) it is an eczema (JADASSOHN);

"(2) it is a pyoderma (DARIER) or a mycotic infection occurring on the skin previously macerated by sweat (SMITH, Lagos, etc.);

"(3) prickly heat is a disease primarily of the sweatglands and every infection is secondary (COATS, POLLITZER, LESSER, etc.);

"(4) prickly heat is not a disease of the sweatglands (TOROK, VOLK) but of the sebaceous glands (UNNA)."

The author suggests that the malady is a partial eczema characterized by an erythematopapular bullous eruption

He considers it unlikely that the eruption is caused by pathogenic organisms. He suggests that the principal aetiological factor is an increase in sweating and that smallness of the external openings of the ducts of the sweat glands is the vital cause

Owing to this smallness the sweat accumulates in and distends the glands. Localized inflammatory irritation is caused. Prickly heat rarely occurs in the axillae because the sweat glands of these areas are large

Simons suggests that *miliasis erythematosa et papulosa tropica* is a preferable name for the malady

He makes an interesting reference to a white leprous patient 20 years of age who failed to develop prickly heat on anidrotic areas of his skin although surrounding areas showed the lesions

He suggests for therapy painting the parts with a buffered sulphur lotion viz —

Acid phosphoric	2 (buffer)
Sodium hydrox	½ (buffer)
Sulph precip	20 (antiseptic)
Zinc oxide	20 (excipient)
Glycerin	10 (excipient)
Spirit per cent ad	100 (disinfectant and cool constituent)

If required menthol camphor or carbolic acid (½ to 1 per cent) with or without citrus oil (this last as a perfume) can be added

The reaction of this lotion must be neutral or slightly acid to litmus. If it is too acid it will cause irritation

R M B MacKenna

CATANEI A. Nouvelles observations sur les teignes en Algérie et dans les colonies françaises. Further Observations on Ringworm in Algeria and the French Colonies. *Arch Inst Pasteur d'Algérie* 1946 June 24 No 2 116-21

were found to have trichophytosis. 58 were Europeans (30 boys and 28 girls) and 602 were Mohammedans (391 boys and 211 girls). Over 70 per cent of the European children presented lesions caused by *Tr glabrum* and in 10 per cent the lesions were due to *Tr violaceum*, *Tr acuminatum*, *Tr fumatum*, *Tr crateriforme* and *Tr plicatile* were demonstrated in other cases. In the Mohammedan children approximately the same percentage were infected with *Tr glabrum* and 25 per cent with *Tr violaceum*, *Tr acuminatum* and *Tr fumatum* were each isolated in three cases whilst *Tr regulare* and *Tr plicatile* were each incultured in one case.

The author claims that the trichophyta which have infected children in Algiers from 1926 to 1946 are now known. During this period *Tr glabrum* was isolated four times more frequently than *Tr violaceum* in the Europeans and three times more frequently in Mohammedans.

Only 40 cases of trichophytosis were discovered since 1926 in a total of 997 children with fungous infections.

Since 1936, favus has been diagnosed in 61 children (10 Europeans, 51 Mohammedans: 50 boys, 11 girls). All were due to *Achorion schönleini*.

The author discusses briefly the types of fungi isolated from cases of ringworm in various French Colonies, including Madagascar, and refers also to infections in adults and children caused by *Ctenomyces mentagrophytes*.

R. M. B. MacKenna.

BYRNE, E. A. J. Effect of Organic Mercurial Preparations on Diseases of the Skin. *Brit. Med. J.* 1947, Jan. 18, 90-92. [13 refs.]

This is a report concerning the treatment of 500 cases of skin disease in the tropics with organic mercurial compounds. The compounds used were phenyl mercuric chloride, acetate and benzoate: the first of these was regarded as preferable, for the acetate and benzoate have a marked affinity for chlorine and, in the opinion of the author, are likely to be converted to phenyl mercuric chloride when in contact with tissue fluids.

Four types of application were used, the first two being loaded with phenyl mercuric chloride—an ointment made with eucerin and distilled water; a calamine lotion in which the compound was precipitated on the calamine: 0.5 per cent. phenyl mercuric chloride calamine powder; an aqueous solution of phenyl mercuric acetate 1/8,000. Instructions concerning the preparation of these applications are given in the paper.

the concentra-

The ointment, therefore, is best applied on lint which is bandaged on to the affected part for a fixed period. It is claimed that 3-4 hours' application of 0.125 per cent. strength was sufficient to overcome the infection in all cases of tinea cruris, corporis, and capitis. For about 24 hours after the treatment the skin was lightly red and itching: then the lesion began to fade and in 5 to 6 days the skin:

In a few
for three hours.

A total of 200 cases of ringworm of the trunk and limbs, 110 of *Epidermophyton inguinale* infection, 90 of epidermophytosis of the feet, 50 of "jungle sores", and 50 of infected wounds of various types were successfully treated.

Epidermophytosis of the feet was treated with the powder, if the lesions were moist, and with the ointment (0.125 per cent. strength) when dry. Socks may be steeped for an hour in 1/20,000 phenyl mercuric acetate solution before being washed: boots and shoes may be sponged with 1/2,000 alcoholic solution of the same compound.

The author discusses the treatment of jungle sores and dhohi itch; also the toxicology of organic mercurial compounds and their mode of action when used for therapeutic purposes.

R. M. B. MacKenna.

SMITH, C. E., BEARD, R. R., ROSENBERGER, H. G. & WHITING, E. G. Effect of Season and Dust Control on Coccidioidomycosis. *J. Amer. Med. Ass.* 1946, Dec. 7, v. 132, No. 14, 833-8, 4 figs. [Refs. in footnotes.]

An intensive epidemiological investigation, based chiefly on the test of skin sensitivity to coccidioidin, was conducted in connexion with the Army Air Fields in the San Joaquin Valley, California, a notorious endemic area of coccidioidomycosis. Routine skin testing was carried out on all new arrivals at the air stations, and the coccidioidin-negative subjects were re-tested at intervals to detect new coccidioidal infections: the coccidioidin-positive reactors were considered to be immune, and none of these developed the

clinical disease. As a result of repeated re-testing of the susceptibles it became evident that the proportion of completely inapparent or asymptomatic coccidioidal infections exceeded that of the clinically recognizable disease.

It is generally accepted that the wind borne desert dust contaminated by the spores of *Coccidioides immitis* is the vehicle of infection and the path of entry is through the lungs by inhalation. Heavy rainfall in the winter by aiding the vegetation of *C. immitis* in the desert soil usually causes a high incidence of infection in the succeeding dry season but rain in the hot dry season by laying the dust reduces the rate of infection. The construction of air fields which involved much excavation and levelling with consequent dust clouds was associated with a high rate of infection but a notable reduction occurred

of swimming pools as an alternative to dry land games is recommended. No solution has been found to the problem of wind borne dust from remote points

J. T. Duncan

SILVA M S. Blastomycet-
ary Blastomycosis
Janeiro 1946 Sep

[Pulmon-
Rio de

The first half of this paper is taken up with a discussion of the classification and nomenclature of the causative fungus in this condition. The majority of those attacked have some agricultural occupation or are working in contact with the soil. Cutaneous mucous glandular and visceral localizations are said to be uncommon but that is probably due to the fact that the lesion present is not diagnosed early often not before pulmonary lesions have been set up. In fact X ray examination of the lungs may first put the physician on the track of correct diagnosis. Radiologically the findings differ from those of pulmonary tuberculosis in being more extensive nearly always bilateral and symmetrical and rarely showing cavity formation. It is commonly said that pulmonary blastomycosis has no symptoms this is erroneous. There is nearly always

stages proves fairly satisfactory and may lead to clinical cure but if treatment is postponed the outlook is bad. Penicillin has wrought no benefit

H. Harold Scott

MISCELLANEOUS DISEASES

FAIRLEY N H. Wartime Research on Malaria and other Tropical Diseases of Military Significance. *The Fight against Disease*. Research Defence Society, London, 1947. v. 35. No. 1. 2-19. [19 refs.]

An informative review of work on malaria, dengue, dysentery and typhus.

D'ABRERA, V. St. E. Further Observations on Cases of Asthma and Bronchitis associated with High Eosinophilia and with Mites in the Sputum. *Indian Med. Gaz.* 1946, Oct., v. 86, No. 10, 414-17. [10 refs.]

GELFAND, M. Idiopathic Thrombophlebitis. *Clin. Proc.* Cape Town. 1946, Nov., v. 5, No. 9, 381-7, 3 figs

The author describes the clinical features observed in 15 cases of idiopathic thrombophlebitis seen by him at Salisbury, Southern Rhodesia. He admits that the aetiology is obscure, and has found no relationship with the Weil-Felix reaction or the platelet count. In all his cases there was pain over the affected vein, and usually fever; the duration of the acute phase varied from a few days to several weeks. Polymorphonuclear leucocytosis was usually found, and the white cell count was generally 10,000 to 15,000, but sometimes higher. [MANSON-BAHR and CHARTERS (this *Bulletin*, 1946, v. 43, 1186) found little lymphocytosis in a few cases.]
the principal vein of a limb,

The author notes that thrombosis usually affects only a small portion of the vein, and that it does not usually spread, though occasionally it may do so. He gives details of one patient in whom the thrombosis spread from the external jugular vein to the subclavian and axillary veins. Emboli are rare, but the author has seen one case.

If the mesenteric or portal veins are involved, the clinical picture is that of an acute abdominal condition, and the prognosis may be very grave. At operation, gangrenous bowel may be found, and a case is described in which three feet of small intestine were removed for this condition, with complete success. "Portal thrombosis is usually rapidly fatal. The chief symptoms are pain, haematemesis and collapse."
Charles Wilcocks.

SAGHER, F. Tropical and Phagedenic Ulcer and Desert Sore. A Review. *Acta Med. Orientalia*. 1946, Dec., v. 5, No. 12, 405-12. [101 refs.]

A review of the literature.

D'IGNAZIO, C. & CODELEONCINI, E. Sul reperto di forme Rickettsiose nel pus poradenitico. [Rickettsial Forms found in Pus from Cases of Poradenitis.] *Bol. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1946, v. 6, No. 5, 243-52. [11 refs.]

The authors have inoculated pus intracranially, the material being taken from cases of Nicolas-Favre disease, into certain laboratory animals, white mice, guinea-pigs and rabbits; and also by Weigl's method they inoculated lice with a culture of the virus. In the last they found Rickettsiae in about 60 per cent. of one group and 33 per cent. of another, 30-50 in a field, always in small masses.
H. Harold Scott.

KATZENELLENBOGEN, I. Granuloma Venereum in Palestine. *Acta Med. Orientalia*. 1946, Dec., v. 5, No. 12, 391-9, 5 figs. [34 refs.]

A survey of 12 cases.

CORCORAN, A. C. & PAGE, L. H. Renal Damage from Ferrobeme Pigments Myoglobin, Hemoglobin, Hematin. *Texas Reports on Biol. & Med.* 1945, v. 3, No. 4, 528-44, 3 figs. [29 refs.]

This paper records the results of experiments designed to determine the degree and nature of the renal injury resulting from myoglobinuria. The

experiments were conducted in dogs whose urine was acidified by administration of a diet rich in casein and meat supplemented by sodium acid phosphate. Renal function was estimated by diodrast and inulin clearances. Myoglobin (in the meta form) was prepared from beef heart muscle. The pigment was made up in physiological saline and sterilized by filtration. It was injected intravenously into unanaesthetized trained dogs. The dosage was calculated

dogs and of sodium ferrihaemate

Myoglobin and metamyoglobin were injected into nine dogs (excluding an experiment in which the pigment was not sterile) and oxy- and reduced forms of the pigment into two. The immediate effects of injection varied. There was an increase of diodrast clearance in five animals associated in three with normal inulin clearance and lowered tubular secretory capacity for diodrast and in two with lowered inulin clearance (one with normal the other with lowered tubular secretory capacity). In one animal the diodrast clearance was normal and inulin clearance and tubular secretory capacity reduced. In all other animals except one in which measurements are not recorded diodrast and inulin clearances and tubular secretory capacity were lowered.

The subsequent effects of the pigment injections can be seen by inspecting the table

initially pig

The effects of injection of haemoglobin were similar to those of injection of myoglobin. Injection of sodium ferrihaemate proved nephrotoxic above a

renal
tially
that

myoglobinuria may be a significant factor in the crush syndrome. They qualify certain experiments (unpublished) in

failure of uremic degree in normally hydrated acidotic rats following injection of myoglobin whereas similar doses of myoglobin in dehydrated rats with crushed limbs often resulted in renal damage. Thus other renal functional changes in addition to aciduria such as oliguria, high urinary salt concentration, ischaemia and functional renal tubular injury may determine the renal damage caused by circulating myoglobin. The authors consider that renal tubular obstruction may result from precipitation of pigment and such obstruction may account for the decrease of glomerular filtration observed (expressed presumably as inulin clearance). The initial maintenance of diodrast clearance following injection of the pigment must therefore be evidence of renal hyperaemia. That renal hyperaemia is present is borne out by the increased diodrast clearances present in five of ten observations. The occurrence of renal hyperaemia during injections of myoglobin or haemoglobin contrasts with oncometric observations of decreased kidney volume during haemoglobin infusion and vitiates the supposition that haemoglobinuric renal injury is primarily ischaemic.

renal

results from (i) tubular obstruction by pigment (ii) impaired tubular secretory

TABLE
Effects of Metamyoglobin, Myoglobin and Haemoglobin Injection on Renal Function in Dogs.

Dog No.	Urine pH	Urine cc./min.	Injected mg./kg.	Retained mg./kg.	C ₀	Percentage Normal			2 days C ₁		Renal Function	
						Immed C ₁	Tm _D	C ₀			C ₀	2 weeks C ₁ Tm _D
21-93	6.5	1.2	88	21	76	59	9	78	57	11	76	77
15-67	6.0	0.8	78	14	101	64	74	72	80	29	97	77
15-79	5.6	0.7	64	114	7	8	61	24	18	80	74	93
15-62	5.8	0.1	146	39	142	105	48	113	119	17	68	68
16-38	5.8	0.2	189	65	118	52	27	81	95	90	04	80
16-54	5.8	0.2	215	78	138	107	30	123	80	61	88	117
15-86	5.3	0.4	252	25	142	107	94	104	103	68	74	86
16-74	5.8	1.0	100	37	71	45	34	85	84	58	198	77
16-04	5.1	1.2	101	77	71	45	34	78	61	35	93	80
15-60	5.9	0.8	101	77	71	45	34	78	61	35	81	92
16-21	5.7	1.0	75	14	121	84	76	78	90	70	119	68
16-29	5.75	0.8	180	62	58	65	36	54	45	43	83	87
Mean	5.60	0.7	136	51	97	72	49	81	75	55	84	100
15-67	5.5	0.5	190	—	99	96	74	90	68	93	109	78
15-79	5.7	0.4	655	—	67	40	43	42	32	29	87	98
16-04	6.5	0.0	582	—	89	95	100	110	75	104	86	83

Legend: Urine pH and volume as measured at the time of pigment injection. Changes in renal function (C₀ equals plasma diodrast clearance, C₁ equals plasma inulin clearance, Tm_D equals tubular secretory capacity for diodrast) are expressed as percent. of control levels. The final observations of function were most commonly made at two weeks or more after pigment injection. The mean of metamyoglobin and myoglobin experiments is the arithmetic mean of the series, but does not include the experiment on Dog No 21-93 in which the metamyoglobin given was not sterile.

result of twelve similar experiments it was found that 566 mosquitoes had been used, and that when there was no human being present 83 of them occurred in the end compartment which could be shut off by the partition. When, however, the human subject was present an average of 264 occurred in that compartment. From these figures the authors calculate an index of attraction :—

$$\frac{264-83}{566-83} = 37.4 \text{ (per cent.)}$$

In other experiments the man sat with his back to the cage or his breath was led away down a pipe and delivered outside the room. In these the index of attraction was nil. In another group of experiments the subject's breath was led away but a fan played over his body and towards the cage. The index was 29. [In this case the authors do not seem to have considered whether the mosquitoes were moving towards a gentle wind or towards the human being.] In another series of experiments the volunteer sat outside the room but his breath was brought in by tube and delivered opposite the end of the cage; the index of attraction was 40. Experiments were also carried out in which the cage was slung vertically over the head of the seated subject.

The authors' conclusions, which are supported by a large amount of experimental work, critically analysed from a statistical point of view, are :—

1. The air expired by the human being attracts mosquitoes.
2. It is not only the expired air which attracts mosquitoes but also other substances emanating from the surface of the human body (though probably with less intensity).
3. In the absence of a horizontal air movement the attraction is exerted in a vertical direction, perhaps because of the column of warm air rising from the man's body.
4. Hungry female *A. elutus* are attracted to the human being, in short experiments (15 min.) from a distance up to 330 cm. (say 11 ft.).

The experiments are essentially simple and the details well thought out. The results have been critically considered with reference to statistical questions. The paper is one that should be studied in the original. *P. A. Buxton.*

KING, W. V. & HOOGSTRAAL, H. Three New Anopheline Records from New Guinea. *J. National Malaria Soc.* 1946, June, v. 5, No. 2, 153-6.

A female anopheline taken in January 1945 from a large rain forest clearing 2 miles east of Lake Sentani, northern New Guinea, proved to be *Anopheles karwari*. Larvae of this species were taken during March to May 1945 in considerable numbers at Hollandia, in a treeless, grassy bog, and in wheel-ruts and shell-holes with a few larvae of *A. farauti* and *A. punctulatus*. Larvae of *Culex whitmorei*, *C. halifaxi*, *C. pullus* and a species of the *C. rishnui* group were also taken. From March to June, adults of *A. karwari* were common in tents after dark but were rarely seen in the daytime. The females bite quite readily but the species is not regarded as a vector of malaria: 119 females were dissected but none was found infected.

Larvae of *A. lungae* were also taken at Hollandia; they were found in muddy hog-wallows with larvae of a species of *Aedes*, *Bironella gracilis* and a species of *Culex*. There were no adults in the houses though *A. punctulatus* and *A. farauti* and intermediate forms were common.

One female anopheline taken in April 1945 may prove to be the new species *Anopheles clowi*.

FEDOROV V G [Detection of *Culex molestus* Forskal in Leningrad] *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 2 53-68 3 figs [Numerous refs] In Russian¹

The author notes the occurrence in Leningrad of a culicine mosquito which was responsible for mass attacks on human beings during the autumn and winter months. Their breeding places were cellars the temperature of which was considerably higher than that in the open. At first this mosquito was identified as *Culex pipiens pipiens* but a thorough study of its morphological characters and bionomics revealed features characteristic of *C. p. molestus*. Like the last named species it readily attacks man and feeds on his blood; it copulates in restricted spaces (stenogamy); lays eggs without a preliminary blood meal (autogenicity); does not enter the imaginal diapause and the females do not fatten towards winter. *C. A. Hoare*

DAVID W A L & BRACEY P Factors influencing the Interaction of Insecticidal Mists and Flying Insects. Part IV. Some Experiments with Adjuvants. *Bull Entom Res* 1947 Jan v 37 Pt 3 393-8 2 figs

The yellow fever mosquito *Aedes aegypti* was employed in experiments to study the mode of action of adjuvants which are added to pyrethrum sprays to enhance their effects. It was noted that with the addition of two common adjuvants N930 (isobutyl undecyleneamide) or Sesame oil the knockdown of the insects was appreciably delayed.

From earlier experiments (DAVID & BRACEY 1944 *Nature* May 13 594) it was known that a part of the effect of these adjuvants was due to their physical effect on the spray droplets. Evaporation was delayed and the larger drops resulting impinged on the insects more readily. Experiments were undertaken to see if the residual enhancement of toxicity could be explained by any such physical action on the spray droplets. It was found that their effect is not due to increasing the dose accumulated by the insect but to some unexplained action on the toxicity of pyrethrins. No synergistic action could be obtained with these adjuvants and the insecticide DDT. *J. R. Bustine*

MADDEN A H SCHROEDER H O KNIPLING E F & LINDQUIST A W A Modified Aerosol Formula for Use against Mosquitoes and Houseflies. *J Econom Entom* 1946 Oct v 39 No 5 620-23

The authors propose to use motor oil (or lubricating oil) to enhance the insecticidal effect of DDT pyrethrum aerosol. It is suggested that the cyclohexanone content be reduced from 10 per cent because it is liable to damage lacquers and plastics if the aerosol be used carelessly. The finally approved formula is —DDT 3 per cent motor oil 5 per cent (viscosity not important) pyrethrins 0.3 per cent to be dispersed by Freon. *J. R. Bustine*

RICE R I JOHNSTONE H F & HEARNS C W A Simple Exhaust Aerosol or Spray Generator for dispersing Insecticide Solutions. *J Econom Entom* 1946 Oct v 39 No 5 652-8 4 figs

This is a technical description of an exhaust generator for fitting to internal combustion engines for the dispersal of insecticides. It has been used successfully against flies and mosquitoes both inside buildings and outdoors and against moths.

The equipment is spraying by trucks and

The authors discuss the theory of this method of insecticide dispersion and describe their experiments for its perfection, the installation of the device on different motor vehicles and light aeroplanes and the methods of its operation.

The subject is illustrated by drawings of the details of construction and by photographs and there are tables of figures showing the performance of the generator on the exhausts of a "jeep" and an aeroplane; and the dimensions of the exhaust aerosol generators necessary for different sizes of engines.

H. S. Leeson.

SYMES, C. B. & HADAWAY, A. B. Initial Experiments in the Use of DDT against Mosquitos in British Guiana. *Bull. Entom. Res.* 1947, Jan., v. 37, Pt. 3, 399-430, 3 plans & 6 figs. on 1 pl.

See this *Bulletin*, 1945, v. 42, 785.

JOHNSON, C. G. Lethane 384 on Clothing as a Mosquito Repellent. [Memoranda.] *Brit. Med. J.* 1947, Jan. 18, 92-3.

The insecticide Lethane 384 (50 per cent. Beta-butoxy Beta-thiocyano-diethyl ether in odourless kerosene) has a certain value as a mosquito repellent on clothing when dimethyl phthalate is unprocurable or cannot be used because of its action on plastic materials. Lethane is not suitable to apply to skin because of its irritant and toxic properties.

Experiments showed that about 4 cc. sprayed over thin cotton stockings had a definite protective effect (nearly 90 per cent.) from bites of various mosquitoes (*Aedes* spp. and *Anopheles claviger*) in Surrey for a period of five hours after spraying. If the stockings were removed and rolled up, the effect was lost by next morning.

A general spraying of the outer clothing could not be relied upon, however, to give protection to uncovered skin of the face and forearms. J. R. Busvine.

WHARTON, G. W. Observations on *Ascoschöngastia indica* (Hirst 1915) (Acarinida; Trombiculidae). Reprinted from *Ecological Monographs*, 1946, July, v. 16, 151-84, 24 figs. [33 refs.]

There are still many gaps in our knowledge of the morphology and behaviour of the trombiculid mites which carry scrub typhus, and their near relatives. This paper is the most thorough account which has yet been published of such a mite.

the species of mite having been recorded from India, the Dutch East Indies, Ceylon, the Maldiv Islands, the Philippines, and the South-West Pacific generally. Its larva stage is a parasite of rats and other small mammals.

A full and accurate account of the mite is given, including a description of the larva, the nymph, the imagochrysalis (resting stage between the nymph and adult), and finally the adult.

Clear and accurate drawings indicate all the stages and it is satisfactory and not restricted solely to small animals. It is able to use this as a foundation on which to base a more satisfactory description of some of the other species.

The section on the biology of the mites is of considerable interest, but is less satisfactory as the author admits that no really successful method of rearing "mass" cultures has been developed

Nymph and adult appear to be carnivorous, and in captivity often cannibalistic and they will feed on their own eggs. It has been possible to rear

between the host vertebrates parasites and the vegetation is given. On this Island the species *Rattus mindanensis* was the host for the larvae. It is interesting to note that they were found to remain attached for as long as 32 days which is a much longer period that has been described for some other species of trombiculid.

Kenneth Mellanby

LABORATORY PROCEDURES

BHATTACHARJI L. M. SINGH J. & SEN GUPTA G. P. A Simple Methylene Blue-Eosin Substitute for Leishman and Giemsa Stains. *Indian Med Gaz* 1946 Oct v 81 No 10 400-401

In 1924 PROESCHER and KRUEGER [this *Bulletin* 1925 v 22, 304] described the preparation of a polychrome methylene blue by means of employing strong oxidizing agents, especially

in India.

Many experiments were made with the use of different concentrations of dyes and oxidizing agents which would readily produce all the effects of metachromatic staining. The following formula was finally adopted as the most satisfactory one —

Methylene blue (medicinal B.P.)	1.0 gm
Potassium permanganate (medicinal)	0.3 gm
Water soluble yellow eosin (B.D.H. London)	0.4 gm
Water distilled or tap	250 cc

The preparation of the stain is described in great detail in the original paper but briefly the steps are as follows —

(1) The 250 cc quantity of water is divided into 3 parts namely 100 cc, 100 cc and 50 cc

(2) In one lot of 100 cc the 1.0 gm of methylene blue is dissolved

added gradually. A fine layer of crystals forms on the surface. Heating is continued for about 10 minutes.

(5) In the remaining 50 cc of water 0.4 gm of eosin is dissolved and added to the steaming methylene blue permanganate mixture and the contents mixed well by stirring. A thick yellow scum appears on the surface.

(6) Heating is continued for an hour or longer, until evaporation is complete, when a thick scum with a metallic lustre is left. The mixture should not be heated too strongly.

(7) The residue is left overnight in a desiccator or a 37°C. incubator: when it is dry, the scum peels off in shining green flakes, or may be removed with a scalpel. This residue is powdered in a dry glass mortar and stored in a dry airtight glass container.

For use as a substitute for Leishman stain, 0.1 gm. of the powder is dissolved by grinding in 40 cc. methyl alcohol. If solution is complete, filtering is not required. Solutions have been shown to keep for months, with excellent results.

When a substitute for Giemsa stain is required, 0.3 gm. of the powder is ground in a mixture of 25 cc. each of glycerine and methyl alcohol, added very gradually. The solution is allowed to remain at room temperature in a glass bottle overnight. Next day, the bottle is placed in a water bath, neck deep, for about 24 hours.

In each case the procedure is identical with that followed in the case of the original stain.

... J. O'D. Burke-Gaffney.

LANGE, H. F. Takata's reaksjon ved ekstrahepatiske lidelser. [Takata's Reaction in Extrahepatic Lesions.] *Nordisk Med.* 1947, Feb. 14, v. 33, No. 7, 432-4. [Summary in English by the author.]

"After extensive use of Takata's reaction the author has found it suitable as a general protein test. Out of 123 cases of positive reaction 73 (about three fifths) occurred in extra-hepatic lesions, especially in chronic, non-specific affections of the lungs. Positive Takata reaction is also in pulmonary diseases an unfavourable prognostic sign."

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

ROSS INSTITUTE OF TROPICAL HYGIENE. INDIA BRANCH. Royal Exchange, Calcutta. Report of the Committee of Control for the Year ended 31st July, 1946 [BANNERMAN, H. C., Chairman]. pp. 5+64, 2 pls. & 1 chart.

This report gives a precise and interesting account of the achievements of the India Branch of the Ross Institute of Tropical Hygiene since its inauguration in 1930 under the direction of its Principal, Dr. G. C. RAMSAY, who has recently retired. The Branch has made very important contributions to the health and welfare of tea estates in Assam and Northern Bengal, of tea, rubber, coffee and cardamom estates in Southern India and of numerous other industrial interests in various parts of India. Although the study of malaria and antimalaria measures have been the chief preoccupation, other important health problems have not been neglected. The effects of the war on tea estates in North-East India are described, as are recent advances in antimalaria work. Altogether it is a record of which the Branch may be justifiably proud.

Norman White.

O'BRIEN, T. P. The Methods and Aims of a Race Relations Institute. *East African Med. J.* 1946, Dec., v. 23, No. 12, 361-84. [24 refs. & bibliography.]

and rooted vegetation slight and snails few the same may be said of the plain of Khuzistan in south west Persia *Hookworm* is rife in Egypt as are other helminths notably *tifecorms* The fly problem is closely bound up with eye diseases and with *typhoid fever* and *dysentery* All these medical conditions are touched upon but the information is already known to readers of this *Bulletin* the book is not intended for specialists in medical problems but for the educated layman and consequently details on these subjects are beyond the strict scope of the work

Studies undertaken in different parts of the Middle East show that speaking generally the area is among the worst nourished parts of the world 70 per cent or even more of the diet energy comes from cereals and roots In irrigated areas there is malnutrition from imbalance of diet while nomads and those with small reserves suffer from innutrition amounting at times to actual starvation after bad seasons Common deficiency diseases are anaemia rickets pellagra osteomalacia and eye affections

As regards *Health Services* more hospital beds are needed the present ratio per population is very low Most of the countries have one or more laboratories for public health services and for research There are nine medical schools in existence some with dental schools attached Only Cyprus Transjordan Ethiopia and the former Italian colonies are without medical schools Most of the men who qualify from these schools stay in the towns so rural areas are poorly served The training of subordinate grades sanitary inspectors midwives dispensers nurses and dressers has come to the fore but recently The question of training men and women for a grade in Government Service inter-

appended to the work is a fairly full list of references and what is rare nowadays a list of the principal persons who have assisted the author with information Both the last furnish abundant evidence that much study and thought have gone to the writing of this book references to books articles papers and pamphlets number 200 and the list of those consulted personally by the author comprises nearly 250 There are plates with interesting photographs well reproduced and maps in the text illustrating rivers irrigated lands and swamp areas and two detailed coloured maps at the end of the work The only inadequate and unsatisfactory part of the whole is the Index which to serve any useful purpose should be full and detailed This could easily be remedied in a future edition

H Harold Scott

TROPICAL DISEASES
BULLETIN.

Vol. 44.]

1947.

[No. 6

SUMMARY OF RECENT ABSTRACTS.*

V. LEISHMANIASIS.

VISCERAL LEISHMANIASIS.

General: Epidemiology: Actiology.

SHORTT (p. 317) has given a condensed but comprehensive account of recent research on kala azar in India, in which so much light has been thrown on all sides of the question, and in which he himself has played a conspicuous part. This account should be read in the original.

LEITÃO (p. 1127) points out that canine leishmaniasis is prevalent in Portugal.

ADLER (p. 721) notes that both human and canine kala azar have been found in Cyprus; the latter is not rare. Ten species of *Phlebotomus* have been found, but it is not known which is the vector.

CANAAN (p. 319) states that although oriental sore is fairly widespread in Palestine, kala azar is comparatively unimportant, though it does occur. Kala azar has been found in dogs in some places.

GEVORKOV (p. 720) finds a close correlation between the total number of dogs, the number of cases of canine kala azar, and the number of cases of human kala azar, in Samarkand. Most of the cases occur in children below the age of 5. The disease is kept under control by systematic measures adopted for early diagnosis and treatment.

GAST GALVIS and RENGIFO (p. 113) have found the first recorded case of kala azar, and several of cutaneous leishmaniasis, during a viscerotomy survey in Colombia.

TCHERNOMORETZ (p. 539) has obtained pure cultures of leishmania forms of *L. infantum* and *L. donovani*, by planting flagellates in tissue cultures of spleen.

SENEKJIE and LEWIS (p. 320) have found that when sera immune to *L. donovani*, *T. cruzi*, *L. tropica* and *L. brasiliensis* are added to cultures of the flagellates in rabbit blood agar, to a strength of 5 per cent., there is strong inhibition of the homologous organism. The action is not so marked with *L. tropica* and *L. brasiliensis*. The active factors are stable at 56°C. but not at 70°C., and complement is not necessary for the action.

NAJERA (p. 721) thinks that *L. infantum* (but not *L. donovani*) may reproduce by schizogony, and describes the stages of this process. Commenting on this paper, WENYON remarks that he finds the illustrations unconvincing.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

DA CUNHA (p. 113) undertook experiments to determine if the different species of *Leishmania* could be differentiated by serological agglutination methods and concludes that they cannot. In comment WENYON criticizes the author in the sense that he has not applied all the methods now used for the antigenic analysis of bacteria.

Transmission

NAJERA (p. 832) notes that larvae of *Phlebotomus* will feed in captivity on dried leaves of various trees and thinks that this may to some extent explain their rural or suburban distribution in nature. He has devised a method of rearing them in which he induces them to eat filter paper (cellulose) by impregnating it with nutritive fluids. He notes that sandflies are more common in

altitude of 1500 metres.

AKALIN (p. 1026) has found *P. papatasi*, *P. perniciosus*, *P. minus* and *P. sergenti* in Anatolia, Turkey.

Pathology

CHATTERJEE (p. 722) has examined the femoral bone marrow in fatal acute cases of kala azar. The total number of cells was diminished and nearly all the clasmotocytes present contained leishmania, but the degenerative changes

For a full description the author thinks that cellular changes will

consequent leakage of fluid into the tissues.

Diagnosis

ARMSTRONG (p. 425) describes two cases of kala azar in British soldiers, contracted in the Mediterranean in which symptoms were very slight. The spleen was enlarged and leucopenia was found, but if this disease had not been borne in mind the cases might easily have been missed. In both marrow puncture was positive.

GHOSH *et al.* (p. 1125) have used a complement fixation test for kala azar, in which the antigen is derived from a culture of *L. donovani*. This is highly specific and is positive even in early cases when the usual serum tests are negative.

For kala azar, the author states that in except very early cases appear to give positive results.

Treatment.

GOODWIN (p. 319) had previously shown that the same technique per 100 spleen cell nuclei, it of hamsters with *L. donovani* as a measure of the therapeutic activity of leishmanicidal drugs. For this estimation he compares a smear of spleen material removed at treatment, with a smear taken a week after with various able v. should pared.

DUR be used in tests of toxic COLLIER and LOURIE have tested the activity of 40 compounds on *L. donovani* cultivated in a special medium (which is described) at 34°C., the highest temperature at which growth occurred. Antimonials of known toxicity in *vitro*, but the technique was of some diamidines, and may be a useful screen for that group.

BOSE *et al.* (p. 1028) have shown the toxicity of urea stibamine (which varies according to the amount of antimonious acid it contains; if it

M reports on the toxicity of stibosan, given by intramuscular injection; this treatment has

I used Stibatin (Glaxo) in kala azar; this contains 20 mgm. of pentavalent antimony per cc., and injections are made into muscle. The patients, however, could not be followed up adequately.

CHAKRAVARTY (p. 833) has followed up 53 cases of Indian kala azar treated with Stibatin (Glaxo), for details of dosage the original abstract should be consulted. In 6 months, 5 had relapsed. The drug is specific and its toxicity is low; it is therefore particularly useful in mass treatment.

GUPTA and CHAKRAVARTY have found that a higher dosage than before, followed up to determine the results.

ADLER *et al.* (p. 114) have tested certain aromatic diamidines on cultures of *L. donovani* to see if there is any correlation between action *in vitro* and *in vivo*; no such correlation was found in the case of propamidine, pentamidine and stilbamidine.

FULTON and GOODWIN have found that a solution, however, in the blood, makes them toxic.

FULTON and GOODWIN (p. 17) have devised a spectrographic method for estimating stilbamidine in biological fluids. They find that in mice it is rapidly absorbed and stored, or excreted since the concentration of it in the serum diminishes rapidly shortly after

By action of the drug by a glyoxal solution, a large proportion of the drug is met in non-fluorescent form. The kidneys, apparently, can eliminate only a limited amount of the compound each day.

OASTLER and FIDLER (p. 1029) have found lesions of the central nervous system of dogs treated with stilbamidine, which are probably due to vascular spasm or anoxia. The authors refer to the nervous disturbances which have

previously been described in man and animals treated with members of the diamidine series

SEN GUPTA (p. 722) has used phenamidine for kala azar but finds that it is less useful than the best pentavalent antimonials or pentamidine. On the other hand it is non-toxic and may have a value when antimonials are contra-indicated for instance in cases complicated by pulmonary tuberculosis.

HORGAN and SATTI (p. 17) found no benefit from the use of penicillin in two cases of kala azar in the Sudan.

SEN GUPTA and CHAKRAVARTY (p. 833) have successfully treated 6 cases of cancerum oris complicating kala azar with penicillin (systemic and local application) and antimonials. This is very satisfactory since as a rule without penicillin the case mortality rate is 50 per cent.

CUTANEOUS LEISHMANIASIS ORIENTAL SORE

CANAAN (p. 319) shows that foci of oriental sore in Palestine have spread considerably since the war of 1914-18. There are now several endemic areas round Jericho (the original area) Bethlehem Jerusalem and Haifa.

KOJEVNIKOV (p. 724) refers to the fact that in Ashkhabad two forms of oriental sore are found the dry (urban) and the moist (rural) forms. He produces good evidence that these two forms do not immunize against each other though when one form occurs in a person who has previously had the other the second sore is often of reduced severity. For prophylactic vaccination therefore the strain common to the area or both strains should be used.

By inoculating contaminated material from oriental sores into liquid or solid media containing penicillin MUKERJEE (p. 1030) has succeeded in obtaining pure cultures of the flagellates with ease.

Referees from the various countries are difficult to the inexperienced.

KAMEL (p. 1126) reports 3 cases of leishmaniasis of the eyelid a site rarely affected.

DOSTOVSKY and SAGHER (p. 1030) report a case of relapse of oriental sore in a girl in Aleppo aged 10 in whom 110 lesions were present indicating a

until the sore had been exposed to Grenz rays. After this healing began and the vaccine test became positive. The author discusses the possible reasons for these changes.

BERBERIAN (p. 18) reports that local injections of a 10 per cent solution of atabrin did not exercise any favourable effect on oriental sore. Intravenous neostibosan on the other hand was useful and subcutaneous injections of a killed vaccine of *L. tropica* by stimulating ulceration favoured rapid healing.

On the other hand MEURIS (p. 1127) achieved rapid cure by injecting quinacrine (atabrin) into oriental sores in 4 cases in Algeria.

HALAWANI and JALILI (p. 540) found that local applications of penicillin had no effect on oriental sore except on secondary infection.

FILATOV (p. 724) has used what he terms tissue therapy for the treatment of various conditions including oriental sore with apparent success. One method is to graft on to the patient skin from a cadaver which has been kept under refrigeration for a week. This process is said to stimulate the healing process.

ANSARI (p. 1127) has inoculated 120 persons in Teheran with cultures of *L. tropica*, to protect them against natural infection. Most oriental sores in nature occur in children aged 10; protective inoculations should therefore be given before this age.

DOSTROVSKY (p. 320) has produced oriental sores, without any incubation period, by injecting 2-16 million flagellates into the skin of volunteers. These are large doses.

MUCO-CUTANEOUS LEISHMANIASIS (AMERICAN).

IRIARTE (p. 1128) describes muco-cutaneous leishmaniasis as it is seen in Venezuela, with special reference to involvement of the nose, mouth and pharynx. Treatment with intravenous tartar emetic is moderately successful.

PESSÔA and BARRETTO (pp. 1127, 1128) discuss the distribution of leishmania in S. American leishmaniasis; most of them are found in histiocytes, but they may occur in polynuclear leucocytes and fibroblasts. Sometimes the parasites are found extracellularly, between cells which have been separated by inflammatory oedema. Parasites are plentiful in the acute stages, but rare in the chronic, they may be found in lymphatic glands near the cutaneous lesions.

DA CUNHA (p. 209) has infected rhesus monkeys with *L. brasiliensis*, by inoculation into the superciliary arches or the nose. In some cases the nasal mucosa became affected, not, as sometimes happens, by direct extension, but by some other, undetermined, channel.

PESSÔA and BARRETTO (p. 1030) show that recovery from S. American cutaneous leishmaniasis is usually attended by very solid immunity. They produce evidence which indicates that vaccination with killed flagellates confers a considerable degree of resistance, and they argue that vaccination may be an important prophylactic measure.

CAMPOS (p. 834) has accelerated the result of the Montenegro cutaneous test, and has eliminated doubtful reactions, by cupping the area after injection of the leishmanial antigen.

CERRUTI (p. 1129) finds that the Montenegro test is positive in S. American leishmaniasis, even if it is done on skin previously scarred by smallpox vaccination or other cause.

Charles Wilcocks.

MALARIA.

DE CRISENOY, J. Fièvres paludéennes et fièvre jaune à Cayenne (Guyane Française) en 1855-1856 [Malarial Fevers and Yellow Fever in Cayenne in 1855-1856.] *Rev. Paludisme et Méd. Trop.* 1947, Feb. 15, v. 5, No. 33, 46-8.

MACKERRAS, I. M. & ABERDEEN, J. E. C. A Malaria Survey at Wewak, New Guinea. *Med. J. Australia.* 1946, Nov. 30, v. 2, No. 22, 763-71, 10 graphs & 1 fig. [20 refs.]

By means of techniques which were specially adapted to the rapid collection of information under war conditions, the authors made a detailed malaria survey at Wewak in New Guinea. The survey was intended to provide a background for other researches into strains of parasites and some more general field investigations, but is here reported as a general contribution to the epidemiology of malaria.

The climate of the area is equatorial, the mean annual rainfall is 87 inches, the transmission of malaria is probably perennial, and the vector

anopheline is *Anopheles punctulatus farauti* which constituted 98 per cent of the total anopheline catch. The sporozoite rate was 2 per cent and the oöcyte rate 3.5 per cent of 200 *Anopheles punctulatus farauti* dissected. From a study of the total numbers of these anophelines present their relationship to the number of men and their sporozoite rates the authors deduce that each human individual receives three or four fresh infections weekly.

The changes in the spleen and parasite rates with age are shown in Table II.

Spleen and Parasite Rates

Observation	73 ¹ Hwain Infants	100 Hwain Children	100 Hwain Women	100 Hwain Men	200 Japanese Wewak	524 Australians, ² Wewak
Spleen rate	93%	92%	60%	55%	8%	10%
Average enlargement of spleen	2.2	1.5	1.2	1.0	0.5	—
Parasite rate	92%	59%	33%	29%	47%	5%
Infection rate	130%	71%	35%	32%	57%	5%
Gametocyte rate	44%	16%	5%	6%	22%	2.5%

¹The spleen rate is based on 61 infants the remainder being scrawlers who could not be palpated.

²Figures from Major I. C. Macdonald and Major J. I. Tonge.

Very large spleens are common in infants and reduction in size usually happens before childhood. There was a normal reduction in parasite counts with age,

immunity and those over this figure represent overt infections. The reduction in the parasite and spleen rates with increasing age was abnormally rapid as compared with findings elsewhere. The authors assume from evidence locally obtained that the minimum number of gametocytes per cubic millimetre necessary to infect anophelines is 40 for *Plasmodium falciparum* and 10 for *P. vivax*. If these standards are correct the spleen rate is a good index of infection.

SABROSKY, C. W. Correction on the Nomenclature of Human Plasmodium.

[Correspondence. Science, 1946, Oct. 23, 401-2.]

Returning to the host of the parasite, the mosquito, the name of the parasite should be *Plasmodium*.

unnecessarily and correctly presented as the name for the parasite of malaria which was the cause of an epidemic in the Pontine Marshes. The description of M and C shows that they were dealing mainly with the malignant tertian parasite.

... would become the genotype ... to suspend the Rules of

Nomenclature in order to designate a type for *Plasmodium*, while the status of *Laverania* Feletti and Grassi as a possible name for the malignant parasite if it should be segregated would not be disturbed.
C. M. Wenyon.

UNGUREANU, E. Nouvelles contributions à l'étude des races d'*A. maculipennis*. Caractères morphologiques des femelles. 1-ère Note. [Morphological Characters of Females of *A. maculipennis*.] Arch. Roumaines Path. Expér. et Microbiol. 1944, Jan.-Dec., v. 13, Nos. 3/4, 487-94, 16 figs. on 9 pls.

The characters described in this paper greatly assist in the differentiation of the adults of *Anopheles elutus* [sacharovi], *A. maculipennis atroparvus*, *A. maculipennis typicus*, and *A. maculipennis messeae* as found in Rumania. All except *A. elutus* have scales on the prothoracic lobes; the wing scales are broadly lanceolate in all except *A. maculipennis atroparvus*, in which they are narrow and sharply pointed; the pale spot at the wing tip is absent in *A. elutus*, present in the others, but rather inconspicuous in *A. maculipennis messeae*.

These differences were seen in captured and bred specimens and are nearly always constant; the degree of constancy among 100 bred specimens of each form is shown in a table; the paper is illustrated by 16 photographs.

H. S. Leeson.

VAN THIEL, P. H. & WEURMAN, C. Observations physiques concernant les causes de la pénétration de l'*Anopheles maculipennis* var. *atroparvus* à jeun dans les locaux habités ou non par l'homme ou par le porc. [Physical Observations on the Entry of Starving *Anopheles maculipennis* var. *atroparvus* Into Occupied or Unoccupied Places.] Bull. Soc. Path. Exot. 1946, v. 39, Nos. 7/8, 290-95.

The authors discuss the factors influencing the entry of *Anopheles maculipennis* var. *atroparvus* into occupied or unoccupied animal and human quarters. They deal with atmospheric conditions inside and outside baited and unbaited traps, inside large open air cages, basing their remarks on experiments performed in 1937 and 1939. Temperatures, relative humidity and saturation deficiencies were recorded and the behaviour of starving mosquitoes observed. The authors conclude that atmospheric conditions by themselves are not the main factors influencing the entry into the traps; but that the odour given off by pig, and to a less extent by man, when occupying these places plays a major part.

H. S. Leeson.

MACHELLA, T. E., with the technical assistance of R. FINE & D. F. BURGOON. The Relationship of Bromsulphalein Retention to the Fever of Natural *P. falciparum* Malaria. Amer. J. Med. Sci. 1947, Jan., v. 213, No. 1, 81-6, 4 figs. [11 refs.]

The bromsulphalein test has been used by the authors to investigate liver function in 33 Chinese soldiers naturally infected with *P. falciparum*, and also in three normal persons in whom fever was produced by means of typhoid vaccine. Observations were made on the malarial patients in the febrile period prior to treatment with atebrian (mepacrine) or sontochin (SN 6911), and at intervals of 1 to 2 days thereafter until excretion of the dye became normal, which occurred in most of the patients within 8 days. Similar tests were also made during the relapse period. In normal persons who received typhoid vaccine, the tests were made before, during and after fever.

The antimalarials used were apparently without influence *per se* on dye retention. Bromsulphalein was given intravenously in doses of 5 mgm. per

kilo of body weight in one arm and blood samples were withdrawn from the other arm 30 minutes later for analysis. It was found that retention of dye

retention and the presence of enlarged spleen [liver not mentioned] or anaemia. A similar degree of dye retention was noted during the period of fever in the vaccinated subjects.

J. D. Fulton

LURYE A. Spontaneous Rupture of the Spleen. *Amer Rev Soviet Med* 1947 Feb. v. 4 No. 3 223-5

An account of 3 cases two of which were due to malaria

TALCONE G. Ocular Complications in Malaria. A Case of Dendritic Ulcer. *Indian Med Gaz.* 1946 Dec. v. 81 No. 12 530-31

Ocular complications are seen in malaria the actual knowledge of the malaria parasite cycle and of the immunological phenomena in malaria are in favour of specific humoral changes the ocular complications may be related to these changes probably as allergic reactions

A case of dendritic keratitis relapsing with malaria attacks is reported and its aetiopathology is discussed

DA COSTA E. Tuberculose e paludismo [Tuberculosis and Malaria.] *Bahia Medica* 1945 Nov. Dec. v. 16 Nos. 5 6 7 13 3 figs

s malar symptoms but who do not respond to antimalaria treatment [parasites presumably are not found in the blood] whom the medical man continues to regard as refractory cases of malaria till the man himself or some friend persuades him to have an X-ray examination and the true tuberculous nature of the

existence of a concomitant tuberculosis

The moral of all this is that patients suspected of or even definitely found to be suffering from malaria who do not respond to specific antimalaria treatment should be carefully examined for tuberculosis. [Another example of the old adage that More mistakes are made from lack of examination than lack of knowledge.]

H. Harold Scott

WALL P. N. Action of certain Antimalarial Drugs on Plasma Prothrombin Level in Normal and Malarial Subjects. *Indian Physica* 194 Jan. v. 6 No. 1 1-8 2 charts [15 refs.]

Experiments confirm the observations of PIRK and ENGELBERG this Bulletin 1945 v. 42, 964

CHHA P. C. & MCKIERJEE S. P. Synthesis of New Antimalarial Drugs related to Atebrin. Parts I and II. *J Indian Inst Sci* 1946 v. 28A Pt. 4 63-74

BAZEMORE, J. M., JOHNSON, H. H., SWANSON, E. R. & HAYMAN, J. M., Jr. Relation of Quinacrine Hydrochloride to Lichenoid Dermatitis (Atypical Lichen Planus). *Arch. Dermat. & Syph.* 1946, Sept., v. 54, No. 3, 308-24, 2 charts. [Refs. in footnotes.]

This report contains the results of investigations made at Moore General Hospital, Swannanoa, N.C., from September 1944. It commences with a discussion of the morphology of the eruption, wherein the authors state that sweating did not occur in the involved areas affected with lichenoid lesions: "in cases of extensive involvement there was generalized hypohidrosis, involving apparently normal skin." In all, 314 cases were observed; in a group of 259 of these, 82 per cent. had dark complexions. The average age of 288 patients was 32.7 years. Most of the patients were white men, but 12 were negroes.

The eruption usually started on the extremities, commonly as an erythema or a papule. Thirty-three patients were examined by gastroscopy and 35 by sigmoidoscopy, by this means, only one case showed a lesion which might have been lichenoid, and this was situated in the colon. Various remedies were tried; therapy with bismuth, mapharsen, vitamin A and "BAL" was not of benefit.

Studies were made to determine the incidence of cutaneous sensitivity to mepacrine and to observe the effect of administration of the drug when the patients' lesions were healing. In all, 198 patients were patch tested. The results were not significantly different from those obtained in a control group of 100 cases of schistosomiasis. Two definite types of reactions occurred when mepacrine (0.2 gm daily) was administered to "susceptible persons". The first type developed within 10 days as an acute erythema with oedema which sometimes progressed to a generalized exfoliative dermatitis: in this type the patch tests were usually positive. The other type of reaction was a localized or fixed eruption which resembled lichen planus and developed after the drug had been given for from 60 to 97 days.

For reasons which are discussed at some length, the authors believe that there is "strong evidence of an etiologic relationship of 'atypical lichen planus' to the prolonged ingestion of relatively large quantities" of mepacrine, but agree that the mechanism of the action of the drug is unknown.

R. M. B. MacKenna.

RAI, B. B. *Enicostema littorale* Blume in Malaria. *Indian Med Gaz.* 1946, Dec., v. 81, No. 12, 506-8, 1 fig.

A trial with 32 cases some success is claimed. The powder is derived from a common Indian plant, locally known as *chhota chiraita*.

CIUCA, M., BALLIF, L., CHELARESCU, M. & CRISTESCU, A. Contribution expérimentale à la thérapeutique contre le gamétocyte à l'aide de la plasmoquine. Recherches expérimentales sur la dévitalisation des gamétocytes de *P. vivax*. [Gametocyte Therapy of *P. vivax* with Plasmoquine.] *Arch. Roumaines Path. Expér. et Microbiol.* 1942, July-Dec., v. 12, Nos. 3/4, 411-18.

The activity of plasmoquine against the gametocytes of *P. falciparum* was early established and this property led to the use of the drug in malarial pro-

infected experimentally, 11 of them with sporozoites and the remainder with

aegypti rests on it for an average of 2.4 minutes but if the paper is impregnated with DDT the resting average is 0.7 minutes

In a second series of experiments essentially similar but including also *Anopheles maculipennis atroparvus* it is again shown that the resting periods on the DDT paper are reduced to roughly a third of the periods on normal paper. There are however more acts of alighting on the DDT. The actual number of *Anopheles* settled on the paper was not much reduced by DDT and the number of *Aedes* was in fact increased (because the increased alightings more than compensated for the shorter periods of rest).

Other experiments are described in which the author used a box with two experimental sides (treated and untreated). The results are not dissimilar, except that the DDT tended to make the insects restless so that rest periods even on untreated surfaces were short.

In all these experiments of both types there were very few deaths after twenty-four hours even following exposure to DDT: the duration of all experiments was twelve minutes long enough to cause measurable excitation but not resulting in death.

The author then carried out critical work on the reactions to light of mosquitoes which had or had not been exposed to DDT for short periods. The insects were put in a small container the walls lined with paper (treated and untreated). After two minutes ports were opened with minimal disturbance and the insects could pass either into a dark or a dimly lit cage. After a further three minutes ports were closed and mosquitoes counted. It was found that with a plain container approximately equal numbers of *Aedes* if the container was lined with DDT paper in the container went to the light. In the container was higher after exposure to DDT than not (i.e. the brief exposure excited them) of those which left the container the proportion going to dim light rather than darkness was high whether or not they had been exposed to DDT. The author points out that the reaction of mosquitoes to light is complex and imperfectly understood. But whatever the interpretation such movements as he describes would result in mosquitoes leaving a dark sprayed house and escaping through a window. They might however owing to the excitation have sampled the walls thoroughly and perhaps remained a considerable total period on them. The author rightly concludes that his experiments raise doubts to what the effect of DDT in house spraying may be: they also show that the treated surface is repellent at least in one sense. But whether the exposure would be sufficient to cause death would depend on many circumstances.

P. A. Buxton

FAY, R. W., SIMMONS, S. W. & CLAPP, J. M. Extended Laboratory Investigations on the Toxicity of DDT Residues to Adults of *Anopheles quadrimaculatus*. *Pub. Health Rep.* Wash. 1947 Jan 31, v. 62 No. 5 149-58 8 figs.

An apparatus is described for exposing young adult mosquitoes for different periods to DDT.

rates of death on

the DDT

Triton X 100

that 4 cc c

per square foot. Results —

(1) Age of deposit — The following are a few selected results from the pooled figures for 50 to 300 mgm deposits

		Percentage kill by different exposures.				
		35 min.	60 min.	90 min.	120 min.	180 min.
Fresh deposit	...	86	98	100	100	100
4 weeks old	...	84	88	92	100	100
20	...	28	49	68	85	93
40	...	—	54	59	69	90
60	...	—	46	62	79	89

(2) *Rate of deposit.*—Further investigations showed that residues below 100 mgm. per sq. ft. were unreliable for lasting effectiveness, while deposits of 300 and 400 mgm. were not sufficiently better than 200 mgm. per sq. ft. to be economically feasible.

(3) *Choice of solvent in the emulsion.*—Tests were made with the following solvents as vehicle for the DDT (a) Xylene (b) Kerosene (c) PD-544C (d) Solvesso No. 2 (e) Velsicol AR-50. From the results it appears that (a) and (d), which were the most volatile, lost most toxicity in the first twelve weeks but were subsequently stable. (a), (b) and (c) were moderately effective for nearly 60 weeks and definitely better than (d) and (e).

(4) *Sex and resistance.*—Tests with males and females of *A. quadrimaculatus* showed that the latter were consistently more resistant. J. R. Busvine.

CLAPP, J. M., FAY, R. W. & SIMMONS, S. W. The Comparative Residual Toxicity of DDT to *Anopheles quadrimaculatus* when applied on Different Surfaces. *Pub. Health Rep.* Wash. 1947, Jan. 31, v. 62, No. 5, 158-70, 6 figs.

The apparatus described in the previous paper was used to compare the residual toxicity of DDT applications (from various emulsions) to mosquitoes. It was found that deposits on rough wood, fabric, well-dried paint and rubbing varnish were effective and persistent. Spray applications on linoleum, fresh paints, spa varnish or simulated adobe (dried mud) were decidedly less effective, presumably owing to adsorption or penetration of the DDT. The dried mud surface was particularly inert even with deposits up to 600 mgm. DDT per square foot.

The emulsions used did not damage plastic screen or fabrics, but if applied too heavily they caused some cloudiness of high gloss enamels and some staining of wall-paper. Where kerosene or Velsicol AR-50 were used as the DDT carriers there was less likelihood of a white bloom of crystals being visible on dark-gloss enamels.

Some DDT sprays were applied to whitewashed surfaces, the pigment being either lime or "spent" calcium carbide. The lime did not appear to have a deleterious effect on the DDT deposit; in both cases the incorporation of salt into the whitewash produced a more effective DDT deposit on the outer surface.

Grease or smoke deposits on surfaces previously treated with DDT, decrease the efficiency of the insecticidal residues. J. R. Busvine.

TARZWELL, C. M. & FISK, F. W. Observations on the Nighttime Resting and Biting Habits of Anopheline Mosquitoes in DDT-Treated and Untreated Buildings. *Pub. Health Rep.* Wash. 1947, Jan. 17, v. 62, No. 3, 84-94, 2 figs.

The development of residual insecticides, the effect of which is dependent on insects resting for a relatively long period on the treated surface, has made a study of the normal resting habits of mosquitoes desirable. The authors studied

made by torchlight first at hourly intervals and later at 15-minute intervals. Observations were made in normal rooms and in those treated with DDT and some associated data on such subjects as biting frequency were also collected.

In untreated rooms mosquitoes rested for considerable periods both before and after biting. The rest period varied from a few minutes to over 11 hours and was about the same in engorged and unengorged specimens. The average resting time for engorged females was 170 minutes but the extreme dispersion round this is shown by the fact that the standard deviation was 124 minutes. The modal resting time was 1.2 hours (30 per cent) while 12 per cent rested for less than 1 hour.

In rooms treated with DDT the picture was quite changed. The resting period varied from a few to 90 minutes, the average for engorged females being 33 minutes with a standard deviation of 20. The modal time was less than half an hour (44 per cent) while a further 36 per cent rested from a half to one hour. The author assumes that the modal resting period is in fact less than 15 minutes. The percentage of engorged females resting on the wall rose from 14 per cent to 31 per cent which might indicate that some of the unengorged mosquitoes were sufficiently irritated by the DDT to leave before biting. Immediate

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influx of mosquitoes coming in search of day time resting places

G Macdonald

STEPHENS P. A. & PRATT H. D. Work with Residual DDT Spray in Puerto Rico
A Report of the First Year's Work. Science 1947 Jan 10 32-3

The common carrier of malaria in Porto Rico is *Anopheles albimanus*, a wild mosquito which feeds on man during twilight or at night and seldom remains inside houses for more than a few hours. EARLE [this Bulletin 1938 v. 35 21] had previously shown that in small native villages little reduction occurred in the number of malaria cases until the *albimanus* population had been reduced to such a low level that animal bait traps collected less than one per night. Application of DDT has not produced a reduction of this nature in *A. albimanus* presumably as a result of its wild habits.

The parasite rate is here studied in an untreated village and in one to which DDT was applied. In the untreated village the parasite rate was 4.7 per cent during the first month and rising to 3.8 per cent in the second month. In the treated village it was 0.5 per cent in the first month and 0.2 per cent in the second month.

that DDT is an effective weapon against malaria even in areas where the carrier is of the wild variety

G Macdonald

LYENGAP M. O. T. Naturalistic Control of the Breeding of *Anopheles sundanicus*
by means of *Eichhornia* cover. J. Malaria Inst. of India 1946 June
v. 6 No. 3 309-10

In areas to the east and south-east of Calcutta it was observed that the breeding of *Anopheles sundanicus* was generally associated with floating algal

growth or submerged aquatic vegetation or both. It was also noticed that ~~vegetation which formed a dense shade over the water surface inhibited the~~
 The most effective of these shade plants seemed to be water hyacinth. Ponds which were completely covered had no larvae and partially covered ponds had larvae only in the open patches.

Several ponds breeding *A. sundauicus* were therefore selected and planted with *Eichhornia* which, six weeks later, covered the whole surface. Subsequent examination showed that, though no larvicide had been used, larvae of *A. sundauicus* had disappeared. Later, three marshes (six to nine acres in extent) were similarly treated and were found to be entirely free of larvae during the period of observation, from June 1945 to February 1946, again without any larvicidal treatment.

The author suggests that shading . . . the breeding of *A. sundauicus* by kill . . . larvae. H. S. LUSON.

WESTPHAL, E. A. & HORTON, R. K. Malaria Control Work in Chimbote, Peru. *Bol. Oficina Sanitaria Panamericana*, 1946, Sept., v. 25, No. 9, 796-809, 5 figs.

The town of Chimbote is at present a small fishing village of about 4,000 population on the coast of Peru 250 miles north of Lima, but is expected to enlarge greatly because there are in the area one of the finest natural harbours on the West coast of South America, an abundance of coal and possibilities of hydro-electric power.

The area is practically rainless, but in the vicinity of the town there are several extensive fresh-water lagoons with a surface area of 218 acres which serve as admirable breeding grounds for *Anopheles pseudopunctipennis*, the local vector of malaria. The only other anopheline in the district, *A. punctimacula* is present in such small numbers as to be unimportant. The spleen rate and parasite rate of 472 children were 24.6 per cent. and 9.1 per cent. at the beginning of the time covered by this report.

During port construction work, temporary control of breeding was obtained by the use of tricalcium arsenite in the form of a water-kerosene emulsion similar to that used for the distribution of paris green. The technique was identical except that the dose of tricalcium arsenite was double that of paris green. As a result breeding was decreased, larvae were present in only 2 to 3 per cent. of their previous numbers, and adult catches decreased from 60 per cent. to 100 per cent. Prophylactic atabrine (mepacrine) was distributed on a voluntary basis. As a result of these various measures the spleen and parasite rates fell to 19.7 per cent. and 5.9 per cent.

The permanent control programme consisted in the drainage of the lagoons to the sea. There was a very small fall for this purpose and water had to be taken through a sand-bar and discharged below high tide level. This presented several technical difficulties but was successfully undertaken; details of the drainage work are included in the paper. By . . . by 90 per cent. to 95 per cent.; e . . . is still in progress.

WOLFSON, FRUMA & WINTER, Mary W. Studies of *Plasmodium cynomolgi* in the Rhesus Monkey, *Macaca mulatta*. *Amer. J. Hyg.* 1946, Sept., v. 44, No. 2, 273-300, 3 figs. [Numerous refs.]

The authors give an account of their study of *Plasmodium cynomolgi* infections in 65 rhesus monkeys. These were produced by intravenous inoculation of

varying doses of parasites in infected blood subcutaneous or intravenous inoculation of sporozoites or by bites of infected mosquitoes. Sporozoites for inoculation were obtained from infected *Anopheles quadrimaculatus* first shown to transmit the parasite by COGGESHALL [this Bulletin 1942 v 39 400]. For blood inoculations the most convenient dose was found to be 100 million parasites per kilogram of body weight. With this dose parasites are evident in thick films on the day following inoculations while the peak of parasitaemia of 10 per cent of infected erythrocytes is reached between the sixth and eighth days. Only a small proportion of monkeys inoculated show typical tertian periodicity uncomplicated by secondary broods of sporulating parasites. Tertian periodicity is more likely to occur if infections are produced by very small doses of parasites if the inoculum is taken from donors showing a clear tertian periodicity or if the parasites to be inoculated are subjected to low temperature freezing.

Monkeys infected by sporozoite or blood inoculation may completely recover from their infection from three and a half months onwards. Reinoculation of recovered monkeys produces infections which differ from primary infections only in the shorter patent period. In view of the tendency to recovery infections should be transmitted at least every six months in order to maintain a strain of this parasite. It has been shown however that parasites subjected to low temperature freezing are viable for nine months. The tendency for monkeys to recover completely from their infections as does man after inoculation with *P. vivax* shows that mammalian malarial parasites differ fundamentally from those of birds which apparently retain infections for life. The authors think that this difference may conceivably be associated with the presence of exoerythrocytic stages in the avian parasites and their possible absence from those of mammals.

C M Wenyon

WOLFSON Fruma & CAKUTOVA Marie Relationship between the Number of Parasites and Parasitized Erythrocytes in Avian and Simian Malaria. *Amer J Hyg* 1946 Sept v 44 No 2 301 11 6 figs

The investigation was carried out on *P. cathemerium*, *P. relictum* and *P. lophurae* infections in ducks and *P. cynomolgi* infections in rhesus monkeys. The infections produced by blood inoculations were studied from the point of view of the percentage of erythrocytes infected and the actual number of parasites per 100 erythrocytes. The values obtained are described by a theoretical curve based on a random distribution of parasites in the erythrocytes. This relationship may be affected by certain conditions. Thus in the first two species long residence in the duck and exposure of the infected blood to low temperature freezing before the parasites were inoculated caused an alteration in the relationship. Long residence alone in the duck of *P. cathemerium* changed the relationship but did not do so in the case of *P. lophurae*. It is thought that the relationship revealed by this study may afford another test of parasite behaviour under varying conditions.

C M Wenyon

HOVANITZ W. Physiological Factors which Influence the Infection of *Aedes aegypti* with *Plasmodium gallinaceum*. *Amer J Hyg* 1947 Jan v 45 No 1 67-81 1 fig [13 refs]

It is common

to find

but within one vector species individual variations are common. Little work has been done to explain this question at all fully.

In the paper under consideration, some preliminary experiments are described. With *Aedes aegypti* and the chicken malaria *Plasmodium gallinaceum* appears to be comparatively little individual variation provided that the same amount of blood containing malaria parasites is ingested on each occasion.

The title of the paper is a little misleading as no other physiological factors, except weight, were studied. There appears to be a relation between the number of eggs laid by a female mosquito and the number of plasmodium cysts which is hardly surprising as both of these conditions are related to the quantity of blood ingested.

Kenneth Mellanby.

CEITHAML, J. & EVANS, E. A., Jr. The Biochemistry of the Malaria Parasite.

IV. The *in vitro* Effects of X-Rays upon *Plasmodium gallinaceum*. *J. Infect.*

Dis. 1946, May-June, v. 78, No. 3, 190-97, 8 figs. [Refs. in footnotes.]

The paper describes the results of an investigation into the effect of exposure to X-rays of red blood corpuscles of the fowl infected with *Plasmodium gallinaceum*. The investigation covered changes in glucose consumption and lactate formation.

The authors used varying doses of X-rays in a container 10 cm. deep and 6.5 cm. in diameter. Infectivity after irradiation was tested by the intravenous inoculation of chicks.

It was found that exposure to 30,000 r units for 16 minutes brought about complete loss of infectivity. The irradiated parasitized cells utilized more oxygen and glucose than did the controls, while they produced lactic acid which the controls did not. Exposure to 10,000 r units had no measurable effect on the oxygen or glucose consumption.

The fact that only three of the test birds developed heavy fatal infections shows that the injection of the irradiated parasites had conferred a sufficient immunity to suppress the infection in 12 of them, in spite of the presence of viable parasites. When the dose of X-rays was reduced to 1,000 r units, exposure had practically no effect on the fact that the chicks became infected.

the controls, exposed to 10, became infected, high doses of X-rays or entirely and the degree of immunity paper are in agreement

Bulletin, 1945, v. 42, 623.

C. M. Wenyon.

ROSTORFER, H. H. & MCGEE, Helen R. Some Factors which decrease Arterial Saturation in Bird Malaria-Ducks infected with *P. lophurae*. *Proc. Soc. Exper. Biol. & Med.* 1946, June, v. 62, No. 2, 151-4, 3 figs.

The authors have found that during the course of malarial infection in the duck there develops an anaemia accompanied by a fall in pH of the blood, a

marked decrease in the CO_2 combining power and a decrease in pK . There is at the same time a shift of the oxygen dissociation curve to the right and a decrease in the saturation of the blood *in vitro*. This decrease bears a linear relationship to the pH and CO_2 combining power except during the 6th and 7th days of infection during which the blood is flooded with young red cells to the extent of 60 to 80 per cent of the total red cells present. The authors believe that these young red cells are responsible for the abnormal decrease in O_2 saturation with the decrease in CO_2 combining power which occurs at this time.

Tests were carried out on mixtures of red blood cells from infected ducks and normal plasma and on mixtures of normal red blood cells and plasma from infected ducks. These did not support the view that the malarial plasma contained some factor capable of inhibiting full oxygenation of the haemoglobin as suggested by WONG (*Science* 1945, Sept 14 278) for *P. vivax* infections in man. It would seem that the state of acidosis and the presence of numbers of young red cells during the terminal phases of *P. lophurae* infections are sufficient to account for the decreased arterial saturation *in vitro* of the blood of malaria infected ducks. When the effect of temperature is superimposed on acidosis the combined effect is sufficient to reduce the percentage of oxygen saturation to 70. These results are in accord with the views previously expressed by RIGDON and ROSTORFER [in the press] that the cause of death is severe anaemic anoxia which reduces the oxygen capacity of the blood to 18 or 19 per cent of the normal.

C. M. HENYON

WOLFSON, TRUMIA. *Plasmodium elongatum* in the Pekin Duck. *Amer J Hyg* 1946 Sept. v. 44 No 2 268-72 1 fig

A strain of *P. elongatum* has been subjected to 41 consecutive transfers by blood inoculation involving 150 ducks in the hope that an increase in virulence would take place. The infection in the duck is characterized by two peaks of parasitaemia in the first and second weeks. Following the standard dose of parasites of 3 billion per kilogram of body weight the peak of parasitaemia remains below 10 per cent. The rapid passage from duck to duck brings about no change in parasitaemia apart from a slight increase during the first ten passages. Nevertheless only 27 per cent of the ducks survived for 16 days while one-half died during the first ten days. Ducks infected with *P. elongatum* develop a severe anaemia with an erythrocyte count of only 300 000 per cmm. This is accounted for by the fact that *P. elongatum* attacks and destroys

duck form a series. At one end is *P. lophurae* which infects by preference

relictum which infect immature erythrocytes but not their precursors giving rise to an intermediate degree of anaemia. Similar to *P. lophurae* as regards its effect on the duck is *P. circumflexum*.

C. M. HENYON

DEARBORN, E. H. & MARSHALL, E. K., Jr. The Susceptibility of Different Species of Avian Malarial Parasites to Drugs. *Amer J Hyg* 1947, Jan., v. 45, No 1 25-8 [15 refs.]

The authors have tested the susceptibility of 4 different species of avian plasmodia in the duck host, to a number of drugs of widely different chemical

constitution. Earlier work on these lines by MANWELL [this *Bulletin*, 1931, v. 28, 600; 1932, v. 29, 710; 1934, v. 31, 428] and by KIRUTHI [Zent. f. Bakt. I. Abt. Orig., 1931, v. 121, 401] who used quinine and pamaquin, showed that different species varied in their susceptibility to these two drugs. The present authors using the methods described by MARSHALL *et al.* [this *Bulletin*, 1943, v. 40, 223; 1946, v. 43, 826], infected white Pekin ducks weighing 100 to 150 gm. with *P. lophurae*, *P. cathemerium*, *P. relictum* and *P. circumflexum* with parasitized erythrocytes varying in number from 50 to 380×10^6 so that the peak of parasitemia occurred on the 3rd to the 6th day in the different infections. Treatment was carried out by the drug-diet method, beginning 18 hours before infection.

The authors used 14 different drugs, which included quinine, pamaquin, quinacrine (atebrin), chloroquine, sulphadiazine and others of the SN series. In order to compare the results obtained with the different species, the quinine equivalents ("the ratio of the minimal effective dose of quinine to the minimal effective dose of the drug under test") obtained for *P. lophurae* infections, were used as standards. With the wide range of drug types employed, marked differences in susceptibility were noted for all four species. Such difference in the same host may have resulted from variation in absorption by the parasites, from interference with different metabolic reactions or it may have depended on different modes of action of the agents used. In selecting drugs for test in human malaria, the use of a single avian plasmodial species cannot therefore be considered satisfactory. By the use of suitable drugs the malarial species themselves may be differentiated.

THOMPSON, P. E. The Effects of Atabrine on the Saurian Malarial Parasite, *Plasmodium floridense* J. Infect. Dis. 1946, Nov.-Dec., v. 79, No. 3, 282-8, 3 figs J. D. Fulton.

A new species of malarial parasite *P. floridense* was recently described in *Sceloporus undulatus*, a lizard from Florida, by THOMPSON & HUFF [this *Bulletin*, 1944, v. 41, 827]. Previous studies by THOMPSON [this *Bulletin*, 1945, v. 42, 541, 1947, v. 44, 43] on the effects of quinine on saurian malaria parasites have been extended in an investigation of the suppressive effect and mode of action of atabrine in blood-induced infections of *P. floridense* in the lizard *Anolis carolinensis*. It was hoped that this cold-blooded vertebrate might be of value in chemotherapeutic research. The methods used were similar to those already described in the above papers. Infections were produced by injecting parasitized blood into the body cavity; atabrine in 0.1 to 0.2 per cent. solutions was given in doses up to 100 mgm. per kilo. of weight by the same route. When the drug was administered during the rise of the infection its progress was inhibited, but the number of parasites in the blood decreased only slowly over a period of 2-3 weeks, and allowed continued observation to be made on their appearance in stained films. Damage to trophozoites and young schizonts was apparent 24 hours after drug treatment and gametocytes and mature asexual forms after 72 hours, the number of merozoites per segment also being reduced. Some parasites, however, appeared to escape damage. When the drug was given on the day of inoculation it did not prevent the appearance of parasites in the blood, although the peak reached was much lower than in controls. The suppressive action of atabrine in this infection appeared to be similar to that of quinine.

J. D. Fulton.

TRY PANOSOMIASIS

DE BORCHGRAVE O Action du chinisol (sunoxol) et d'autres produits pharmaceutiques sur *Trypanosoma gambiense* et sa parasitose chez le cobaye [The Action of "Chinisol" and other Compounds on *T. gambiense* *in vitro* and in Guinea pigs] *Rev. Belge Sci. Méd.* 1941 Nov. 13 No 9 356-63 1 fig. [21 refs.]

The following compounds were examined for activity against an arsenic resistant and a sensitive strain of *T. gambiense* —

Quinine derivatives	Acridine derivatives	Miscellaneous
Chinisol (or Sunoxol) Plasmochene (Bayer) Quinine hydrochloride	Atebrine (Bayer) Argo flavine (Bayer)	Astreptine (i.e. sulphanilamide) Nipagin M (i.e. methyl ester of <i>p</i> -hydroxybenzoic acid) Carboic acid

For *in vitro* tests infected blood was obtained by cardiac puncture and mixed with 1/10 its volume of 5 per cent sodium citrate solution or with 1/5 its volume of liquid Roche anticoagulant in the presence of varying concentrations of the compound under investigation. After a few seconds or after 1 to 5 minutes at room temperature the mixtures were then inoculated subcutaneously in amounts of 1 cc into guinea pigs which were subsequently examined for evidence of infection. When blood from guinea pigs heavily infected with the arsenic resistant strain was used each of the compounds was found capable of sterilizing the trypanosome containing mixture in a few seconds at concentrations of 1/500 or within 5 minutes at concentrations of 1/1 000.

In similar tests with the arsenic sensitive strain chinisol was compared with quinine hydrochloride the time of exposure *in vitro* being 20 minutes. The former compound proved to be five times as active as the latter the sterilizing concentration being 1/5 000 as compared with 1/1 000.

Motility is retained by trypanosomes apparently for a longer period than infectivity during *in vitro* contact with chinisol. Thus whilst infectivity was lost within 5 minutes on exposure to a concentration of 1/1 000 motility persisted under the same conditions for periods which varied in different experiments between 45 minutes and 7 hours.

The minimum lethal subcutaneous dose of chinisol for rats is about 1 gm per kilo body weight and for guinea pigs 0.1 gm per kilo. Red blood

of 0.5 gm to 500 cc blood with the use of a pipette is a possible method of subject of trypanosomiasis and where it is therefore necessary to take special precautions against transmitting infection.

As a therapeutic agent however chinisol exhibits little activity. A dose of 0.05 gm per kilo body weight cleared parasites (of either strain) from the blood of infected guinea pigs but relapses occurred 3 to 8 days later.

E. M. Lourie

MUNIZ, J. & DE FREITAS, G. Estudos sobre a imunidade humoral na "Doença de Chagas". [Humoral Immunity in Chagas's Disease.] *Brasil-Médico*. 1946, Oct. 19 & 26, v. 60, Nos. 42/43, 337-41. [13 refs.]

The authors have found that for the preparation of *Trypanosoma cruzi* antigen, large quantities of the culture forms can be obtained by growth on a medium consisting of 2 per cent. nutritive agar containing 2 per cent. glucose, at a pH of 7.2, with the addition just before use of 10 per cent. defibrinated rabbit's blood. This is essentially Nöller's medium. From the culture forms removed from the surface of the blood agar in a 2 per cent. solution of glucose an antigen is prepared according to the technique of DAVIS [this *Bulletin*, 1943, v. 40, 890] in which the mass of disintegrated organisms is suspended in a saline solution of merthiolate, which ensures the retention of the antigenic properties for a considerable time. With this antigen complement fixation tests in acute and chronic cases of Chagas's disease and in experimental infections in rhesus monkeys have been carried out and correlated with agglutination and precipitin reactions. In four monkeys the complement fixation was positive on the 4th day of the prepatent period, which lasted from 8 to 10 days. On the 2nd day of the prepatent period the sera of the monkeys agglutinated in titres of 1/160 to 1/320. On the 10th day the titre had increased to 1/1,280 to 1/2,560. In one monkey which survived as a result of vaccine treatment, the serum showed a titre of 1/1,280 after 20 months. The precipitin test was positive from the 4th or 5th day of the patent period.

The sera from six acute human cases of 15 to 40 days' duration, strongly fixed complement in titres of 1/40 to 1/160. The agglutinating strength of the sera gave titres of 1/2,560 to 1/20,000, while the precipitin test was strongly positive in ten minutes. The agglutinating strength of the sera of four acute cases tested a number of times during periods varying from four to 20 months showed considerable variations. Whenever the agglutination occurred at a titre higher than 1/640 the precipitin test was positive. Of the sera of 211 chronic cases, 80 per cent fixed complement, 83 per cent. gave agglutination in titres of 1/160 to 1/2,560, while 18 per cent. showed a positive precipitin reaction. The serum of a case of 30 years' standing showed agglutination at 1/640.

In these reactions and their variations the authors see reflected the changes which occur in the immunity during the course of *T. cruzi* infections. The immunity manifests itself when the reticuloendothelial system is first mobilized at the initial invasion of the tissues by the parasite. It increases when the blood is invaded by the trypanosome stages, which at first increase in number and then, after 30 or 40 days, begin to decline. It is then that the trypanosomes are largely phagocyted. They may be destroyed, but on the other hand they may become resistant to the destructive power of the phagocytes and begin to multiply within them as leishmania forms. The authors suggest that the formation of leishmania forms is not only directed to multiplication, but that it is also a means of protection, whereby the infection can be maintained when few or no trypanosomes can remain in the blood. In support of this view they have noted that if serum from a patient with high agglutination titre, mixed with the liquid from glucose blood agar, is employed as a culture medium, flagellate forms do not occur, but only masses of leishmania forms. When these leishmania forms are transferred to medium devoid of immune bodies, transformation into crithidia and trypanosomes takes place. In chronic phases of the disease, the decrease in the antibody content of the serum is due to the localization of parasites, as leishmania, at remote situations such as the muscle fibres of the heart, where they continue to multiply and infect new cells, but fail to stimulate any marked antibody formation. This balance between host and parasite may break down from various causes.

C. M. Wenson

1. IREJANI O Studies in Trypanosomiasis I The Plasma Proteins and Sedimentation Rates of Erythrocytes of Rats Infected with Pathogenic Trypanosomes *J Parasitology* 1946 Aug 32 No 4 369-73 [10 ref]
11. — II The Serum Potassium Levels of Rats during Infection with *Trypanosoma lewisi*, *Trypanosoma brucei* and *Trypanosoma equiperdum* *Ibid* 374-8 2 figs
111. — III The Plasma, Whole Blood and Erythrocyte Potassium of Rats during the Course of Infection with *Trypanosoma brucei* and *Trypanosoma equiperdum* *Ibid* 319-52 12 refs 1
- 1V. — IV The Fragility of the Erythrocytes in Rats during the Course of Infection with *Trypanosoma lewisi*, *Trypanosoma brucei* and *Trypanosoma equiperdum* *Ibid* 383-6

In the first paper of this series an account is given of an investigation of the proteins during the course of *T. brucei* and *T. equiperdum* infection in rats. It has shown that there is a loss of protein chiefly albumin as a result of lipoid nephrosis. Albumin can be detected in the urine. This brings about a fall in the serum albumin globulin ratio. In the plasma the concentration of the globulin fraction may actually exceed that of the albumin fraction. At the same time there is acceleration of the sedimentation rate but this does not appear to be related to the protein changes. The responsible factor is in the red cell for if the rapidly sedimenting red cells are suspended in the plasma of a normal animal the increased rate of sedimentation is maintained whereas if red cells of a normal animal are suspended in the plasma of an infected animal there is no acceleration.

count without any preliminary rise. In the case of the two pathogenic trypanosomes there is an increase in the serum potassium. There is a suggestion that this serum potassium may have come from the red blood corpuscles which are reduced in number. In *T. lewisi* infections there is no increase in serum potassium.

The third paper of this series is by the same author.

erythrocytes suffer cellular damage. As the serum potassium increases only towards the end of the infection it does not seem to be a cause of death. More probably it is a result of the moribund state.

In the fourth paper it is noted that there is an increased fragility of the erythrocytes tested against hypertonic salt solution in infections of rats with *T. brucei* and *T. equiperdum*. In *T. lewisi* there was no such increase. The increase in the case of the pathogenic trypanosomes may be due to the acidosis and anaemia while the increased serum potassium may play a part.

C. M. HENYON

FEVERS OF THE TYPHUS GROUP.

SHEPARD, C. C. & TOPPING, N. H. Preparation of Suspensions of Rickettsiae from Infected Yolk Sacs without the Use of Ether. *J. Immunology*. 1947, Jan., v. 55, No. 1, 97-102.

The authors describe a method of preparing rickettsial suspensions from infected yolk sacs. The method is similar in principle to the one devised by FULTON and BEGG, who prepared suspensions of rickettsia from infected mouse and rat lungs. [See VAN DEN ENDE *et al.*, this *Bulletin*, 1947, v. 44, 472.]

A brief summary of the method, in the authors' own words is:—"Washing the rickettsiae by centrifugation, and absorption of much of the remaining yolk-sac material with Celite."

Suspensions of the rickettsiae of epidemic typhus, murine typhus, and Rocky Mountain spotted fever, were found to give very satisfactory agglutination with their homologous immune sera, but suspensions of Q-fever rickettsiae did not give sharp end-points when used in testing Q-fever immune sera.

Yolk-sac cultures of scrub-typhus rickettsiae were not found suitable for the preparation of suspensions, the original growth was too scanty, and after preparation hardly any organisms could be detected.

Ether treatment of the prepared suspensions caused no liberation of soluble antigen such as occurred when untreated yolk-sac rickettsial suspensions were purified with ether, but when normal yolk-sac material was added to the prepared suspensions soluble antigen was liberated.

John W. D. Megaw.

HAMPTON, S. F. Anaphylactic Shock in Egg-Sensitive Individuals following Vaccination with Typhus Vaccine. A Study of the Antigenic Relationship of Egg and Chicken Meat Antigens and Typhus Vaccine. *J. Lab. & Clin. Med.* 1947, Feb., v. 32, No. 2, 109-17.

A detailed investigation of two cases, following injections of a chick-embryo vaccine. It is suggested that persons about to receive vaccines prepared from chick-embryos should be questioned regarding egg-sensitivity, and, where this is probable, should be skin-tested with the vaccine in advance. This would apply equally to any other vaccines derived from egg-inoculation.

H. J. O'D. Burke-Gaffney.

WINKLE, S. Zur Typendifferenzierung in der Gattung *Proteus* Hauser. [Type Differentiation of Strains of Proteus Organisms.] *Zent. f. Bakt. I. Abt. Orig.* 1945, Jan. 20, v. 151, No. 8, 494-501.

An extensive study was made of 1,084 strains of *Proteus* organisms isolated from human beings in areas free from rickettsial infection in man.

Some of the strains were closely related to *Proteus* X2, X19, and XL in respect of their H antigens; others were related to *Pr. XK* in respect of their O antigens. By cross-agglutination and absorption tests, 12 serological types were differentiated, including four that behaved like X2, X19, XU, and XK.

Biochemical tests were carried out on 1,117 strains, and eight distinct types were found to occur. In most cases all the strains belonging to the same serological type gave the same biochemical reactions, but, exceptionally, a few of the X2, X19, and XK strains gave aberrant responses to the biochemical tests; the author suggests that the abnormal reactions may have been due to repeated subculture of the strains over a long period.

John W. D. Megaw.

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In the second paper it is shown that in *T. lewisi* and *T. equiperdum* infections in rats the animals reveal an increase in the erythrocytes followed by a steady reduction. In *T. brucei* infections however there is a fall in the erythrocyte

reduced in number. In *T. lewisi* infections there is no increase in serum potassium.

The third paper still further considers the serum potassium level in *T. brucei* and *T. equiperdum* infections. When the serum potassium level increases this is accompanied by a reduction in the potassium level of the erythrocytes and of the whole blood and a decrease in the erythrocyte volume. It seems that the increased potassium of the serum is only partially accounted for by that lost from the erythrocytes. The remainder comes from body cells which with the erythrocytes suffer cellular damage. As the serum potassium increases only towards the end of the infection it does not seem to be a cause of death. More probably it is a result of the moribund state.

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WINKLE, S. Zur Typendifferenzierung in der Gattung *Proteus* Hauser. [Type Differentiation of Strains of *Proteus* Organisms.] *Zent. f. Bakt.* I. Abt. Orig. 1945, Jan. 20, v. 151, No. 8, 494-501.

An extensive study was made of 1,084 strains of *Proteus* organisms isolated from human beings in areas free from rickettsial infection in man. Some of the strains were closely related to *Proteus* X2, X19, and XZ in respect of their H antigens; others were related to *Pr. XA* in respect of their O antigens. By cross-agglutination and absorption tests, 12 serological types were differentiated, including four that behaved like X2, X19, XU, and XA.

Biochemical tests were carried out on 1,117 strains, and eight distinct types were found to occur. In most cases all the strains belonging to the same serological type gave the same biochemical reactions, but, exceptionally, a few of the X2, X19, and XA strains gave aberrant responses to the biochemical tests; the author suggests that the abnormal reactions may have been due to repeated subculture of the strains over a long period.

John W. D. Megaw.

WINKLE S Über die Isolierung von zwei Stämmen *Proteus* \19\ [Isolation of Two Strains of *Proteus* \19\ *Zent f Bakt I Aht Orig* 1945 Jan 20 \ 151 No 8 501-3

Two strains of *Proteus* \19\ were isolated as a result of blood stool and urine examinations of persons suffering from or suspected of typhus one an O form from the blood and the other an O-H form from the urine

H J O D Burke-Gaffney

POLLARD M WILSON D J LIVESAY H R & WOODLAND J C The Oral Transmission of Murine Typhus in Humans. *Texas Reports on Biol & Med* 1946 \ 4 No 4 446-51 3 charts

Each of six young and healthy volunteers swallowed 40 cc. of a saline suspension of untreated yolk sac material of chick embryos infected with murine typhus. The suspension was given in gelatin capsules four hours after lunch and two hours before the next meal. The experiment was carried out in strictly controlled conditions.

Five of the volunteers remained normal both clinically and serologically the sixth after an incubation period of 11 days had a typical attack of murine typhus in which the Weil Felix (*O*\19\ titre rose to 1:1,280 and the complement fixation titre reached 1:2,560.

The authors state that the dosage administered to the volunteers was probably very large in comparison with possible natural dosage by mouth. No evidence was found suggestive of the presence of any lesion of the gastrointestinal tract.

The authors think that certain cases of the disease may possibly occur through swallowing food contaminated with infected flea faeces or rat urine.

[In the circumstances most workers on the typhus fevers will probably regard the findings as evidence that natural infection by ingestion of infected material is likely to be a rare occurrence.]

John H D Megaw

LIT W T Isolation of Typhus Rickettsiae from Rat Mites, *Liponyssus bacoti* in Peiping. *Amer J Hyg* 1947 Jan \ 45 No 1 58-66 4 figs [21 refs]

During an epidemic of typhus fever in a poorhouse in Peiping 81 rats (*Rattus norvegicus*) were trapped. 32 of these were Weil Felix positive. Two of the latter group were investigated and both yielded strains of typhus rickettsiae. Among 189 smears prepared from *Xenopsylla cheopis* fleas from the captured rats 39.2 per cent showed rickettsia like bodies and among smears of 56 *Ceratophyllis anisus* fleas 16.1 per cent showed similar bodies but in smaller numbers.

Mites (*Liponyssus bacoti*) were found on 25 of 64 rats and among smears of 100 of the mites examined four showed rickettsia like bodies. From each of two pools of the mites a strain of rickettsia was isolated one of these was transferred through three rats then through five mice and 12 successive guinea-pigs. Only three of the guinea-pigs developed a scrotal reaction.

The author discusses the possibility that transmission of infection by the mite may occur from rat to rat and from rat to man but he seems to favour the view that fleas are the chief if not the only vectors.

John H D Megaw

LUDWIG R G & NICHOLSON H P The Control of Rat Ectoparasites with DDT. *Pub Health Rep Wash* 1947 Jan 17 \ 62 No 3 77-84 8 figs (6 on 3 pls)

In this well illustrated article the authors describe a carefully conducted field study of the control of fleas and other ectoparasites of rats by dusting the

burrows and runs of the rats with a 10 per cent. DDT powder. For the burrows, a foot-pump duster was used, and for the runs a hand-shaker duster was found suitable.

In 11 premises the infestation rate of *Xenopsylla cheopis*—the predominant rat flea—was reduced by 99·3 per cent. when tested five to eleven days later; this percentage of control fell off by about 5·0 per cent. *per mensem* during the following four months.

Rat lice and mites were also controlled, but less effectively; the numbers were not great enough to justify a percentage estimate of the reduction effected.

Care is advised to avoid contamination of food-stuffs with the dust.

John W. D. Megaw.

KALRA, S. L. Report on the Distribution of Typhus Fever in the Army in India 1943-46. *J. Indian Army Med Corps.* 1947, Jan., v. 3, No. 1, 10-12, 2 graphs.

The title and substance of this paper may be misleading unless certain assumptions made by the author are taken into account: among these are (1) "high OX2 or high OX12 and low OX19 agglutinins indicate tick typhus," and (2) "high OX19 agglutinins indicate murine typhus in India."

The following table must be read in the light of these assumptions, which are not justified, as will be seen from the next abstract and from various articles dealing with the Weil-Felix responses in tick-borne typhus fevers. The headings of the table should be OXA type, OX19 type, and OX2 type instead of Scrub typhus, Murine typhus, and Tick typhus.

Typhus Cases in different parts of India.

Province	Scrub typhus	Murine typhus	Tick typhus
Bengal [and Assam]	237	40	5
United Provinces	17	30	13
Punjab	5	90	9
Central Province... ..	33	51	47
Bombay Presidency	15	49	18
Madras and Mysore	56	75	24
All India	363	335	116
All India less Bengal and Assam	126	295	111

In spite of the above reservation the findings can be regarded as constituting *prima facie* evidence that mite-borne, flea-borne and tick-borne typhus fevers are widely distributed in India, and that the mite-borne type is specially prevalent in Bengal, Assam and Madras.

From the charts showing the seasonal distribution of the three types it

November, December and January, and less than 25 in the other months.

References are made to the isolation of two strains of the rickettsia of tick typhus—one from a patient in Poona (Bombay Presidency) by Major Seaton, the other from a tick (*Haemaphysalis leachi* var. *indica*) in Imphal, by the author. These strains are said to be of low virulence, dying out after a few passages in guineapigs, but showing some antigenic relationship to *Rickettsia rickettsii*.

No mention is made of the tick-typhus rickettsia stated by Kalra to have been isolated by the senior author from a patient; Kalra's paper appears to have been written at a later date than the present article, which was received for publication in July, 1946.

Sera giving NK-type agglutination were not further investigated because their *Proteus*-agglutination response was regarded as diagnostic; most of them came from the Burma Front, but an outbreak occurred in a training establishment in a jungle area in Mysore, and there were isolated cases in the Punjab, Kashmir and elsewhere.

John W. D. Megaw.

HENDERSON-BEGG, A. & FULTON, F. The Standardisation of a Scrub Typhus Vaccine. *J. Path. & Bact.* 1946, July, v. 58, No. 3, 381-9, 3 coloured figs. on 1 pl.

To meet the special needs incident to the large-scale production of cotton-rat-lung typhus vaccine the authors have devised a special method of standardizing the vaccine. The rickettsiae seen in impression smears of the infected lungs are counted after staining by the polychrome-methylene-blue method, already described by HENDERSON-BEGG and others [see this *Bulletin*, 1946, v. 43, 436].

The rickettsial content of the vaccine was estimated by a similar direct method of counting the organisms and also by measuring the amount of specific complement-fixation antigen contained in the vaccine.

The results obtained by these two methods were in substantial agreement with each other. Details of the new techniques involved are given in the paper.

John W. D. Megaw.

AUDY, J. R. Scrub Typhus as a Study in Ecology. *Nature*. 1947, Mar. 1, 295-6.

Investigations in Assam connected with the epidemiology of scrub typhus (tsutsugamushi disease) showed that different areas presented very different risks of infection to troops occupying them. These differences were correlated with the presence or absence of the mite vector of the disease, *Trombicula deliensis* Walch. The distribution of this mite and of various other species was studied and also the manner in which they parasitized the rodents in the same areas. Mites were found to form useful "ecological labels", for their presence on rats could be used to indicate the territory in which the rodents had been travelling. Frequently the rats seemed to be restricted to very small areas of ground. Not only could mites be used to indicate the movements of the rats, but the trapping of rats could give complementary information as to the presence of mites. It is suggested that mites could be used as ecological labels and aid the study of rodent movements.

Kenneth Mellanby.

WEIL, A. & HAYMAKER, W. The Distribution of the Pathologic Lesions of the Central Nervous System in Scrub Typhus (Tsutsugamushi Disease). *J. Neuropath. & Exper. Neurol.* 1946, Oct., v. 5, No. 4, 271-84, 15 figs.

The authors made gross and microscopic studies of the entire central nervous system in 21 cases of scrub typhus. In 15 cases in which the duration of the illness was known, it had varied from 8 to 31 days, with an average of 14.

The tissues were fixed in 10 per cent. formalin, embedded in paraffin, and stained with haematoxylin and eosin (for special studies, cresyl violet and silver stains were used).

[See also the next abstract.] It is also stated that Kumaon strains of tick typhus though not yet confirmed are behaving similarly. These appear to be the first cases in which *R. rickettsi* has been isolated in India.

It is stated that the present investigation in Kumaon Hills has revealed that scrub typhus is as common in these hills as in Assam or Burma and that *R. orientalis* has been recovered from *Trombicula deliensis* mites which are found in abundance at heights of 7 000 feet in the Kumaon Hills.

John H. D. Megaw

SEATON D. R. & STOKER M. G. P. A Serological Analysis of Typhus Cases in India by Weil Felix, Rickettsial Agglutination and Complement-Fixation Tests. 4 in *Trop. Med. & Parasit.* 1946 Dec. 40 Nos 3/4 347-57 2 figs. 19 refs.

In the study described in this paper the authors have applied modern serological methods to the differentiation of tick borne from flea borne typhus in India. Sera of all patients in military hospitals in whom the Weil Felix reaction was of the O\19 or O\2 type were tested by a complement fixation reaction.

supplied by Cox and was of yolk sac origin.

During the six months ending March 1st 1946 40 sera of the above serological types were tested. 18 of these reacted with murine antigen at titres ranging from 1/20 to 1/320 and were negative with R\157 antigen. 16 reacted with R\157 antigen at titres of 1/5 to 1/320 and were negative with murine antigen except for one serum in which the murine titre was 1/20 and the R\157 titre was 1/160. In five cases both reactions were negative and in the remaining case the reaction with both antigens was positive at a titre of 1/5.

Control tests were carried out on 37 sera of which 20 were from normal persons, 7 were from various diseases.

Of the 18 sera positive the \19 type three of and \2. Of the 16 sero reactions of the \2 type complement fixation react

as coming from patients suffering from infections of the same antigenic type as Rocky Mountain spotted fever and so as furnishing further evidence that tick typhus occurs in India.

Rickettsia agglutination tests were carried out with epidemic and murine rickettsiae on all the 40 sera. Positive reactions occurred with both types of rickettsiae but the only feature of the responses that was of differential diagnostic significance was the occurrence in murine typhus sera of higher titre reactions against murine rickettsiae than against epidemic. The tick typhus sera gave approximately equal titres against both types.

A reference is made to the strain of rickettsia isolated by Kalra [see the preceding abstract]. It is stated that the rat from which the infected tick was

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Kenneth Mellanby.

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Whilst the intensity of the lesions found varied considerably, their distri-

choroid plexuses showed reactions varying from mild oedema to marked cellular infiltration consisting mostly of histiocytes but with many lymphocytes and some plasma cells. The exudate was most marked in the periventricular region, basal ganglia and amygdalo-hippocampal complex.

Focal inflammatory nodules were relatively few and when present were found mostly in the grey matter of the cerebral cortex though they did occur in the white matter and in the periventricular region. The paper is well illustrated by 12 microphotographs and three sets of clear diagrams.

H. J. O. D. Burke-Gaffney

BARTONELLOSI

HODGSON, C. H. The Treatment of Carrion's Disease with Large Transfusions
Amer. J. Trop. Med. 1947 Jan. 1, 27 No. 1 69-75 2 figs

Most text books on tropical medicine make no reference to the treatment of

used heretofore but never in sufficient quantity to attempt to replace the amount of blood being destroyed.

The two cases here described occurred in men aged 50 and 43 respectively and the symptoms in both were typical. The corpuscle destruction was rapid—from 4 300 000 to 1 370 000 per cmm in a couple of days in the former and to 1 800 000 shortly after admission in the latter. The haemoglobin was reduced to 32 and 30 per cent respectively.

The first patient received 3 410 cc. of citrated blood in six slow drip transfusions in a fortnight. Two intervals, one of 6 days and one of 4 days, intervened because the patient's family was persuaded by their friends that this was not the proper treatment but they gave way and allowed them to be resumed when the symptoms became worse. One of the donors had had the disease 10 years before.

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In the first patient the eruption stage appeared 3½ months after the onset of fever in the second nearly a year after.

The transfusions were in all cases by the slow drip indirect citrate method.

The use of penicillin has been reported upon favourably but is probably most useful in the secondary infections pneumonia for example which may be fatal.

complications in Carrion's disease. The author makes the sound comment: "Naturally, one cannot say what would have been the outcome if these two patients had not been treated in this manner. They are not presented as a representative series. I can merely state that they were both seriously ill, both had severe anemia, both were definitely improved by transfusions and both recovered." [A most interesting paper. We must not, of course, deduce too much from a record of only two cases, but the results attained and the rational basis on which the treatment rests, call for further trial.]

H. Harold Scott.

YELLOW FEVER.

FINDLAY, G. M. The Internal Combustion Engine and the Spread of Disease. *Brit. Med. J.* 1946, Dec. 28, 979-82, 1 map. [15 refs.]

Increased traffic by road, rail and particularly by air provides opportunities for the spread of disease. The author fears that the present organization for the prevention of spread of disease by air traffic is inadequate, and that it should be replaced by another, more efficient one, before the post-war flood of air travel rises to its height.

Many diseases can be spread by aircraft; the two which are especially feared are yellow fever and malaria, but other possibly important ones are dengue, poliomyelitis, the insect-transmitted forms of encephalitis, trypanosomiasis and acute respiratory infections.

Many aircraft must touch endemic yellow fever zones, and it has been proven that mosquitoes can readily survive journeys of over 9,000 miles in which heights of 10,000 to 12,000 feet were reached. It is also possible that *Anopheles gambiae* might again be spread from its African home by air, and produce disastrous epidemics elsewhere as it did in Brazil in 1938. Prevention of spread of disease or disease-carriers involves the sanitary control of (a) airfields, (b) aircraft, and (c) air passengers, crew and ground-staff. These measures require elaborate staff and organization, which may often be satisfactory, but on the other hand may be inadequately supervised, despite the requirements of the International Sanitary Conventions for Aerial Navigation.

Although passengers may have been inoculated against yellow fever, they may not have been protected against it, as a result of faulty technique in the preparation, carriage, dilution or administration of the vaccine. Certificates of inoculation are insufficiently standardized, may be signed by any medical officer, and have even been known to have been forged. Many similar loopholes exist in the present arrangements: to close them the author suggests that an international organization, with staff and funds of its own, should be formed under the W.H.O., in close association with P.I.C.A.O. It should be formed from a national Civil Aviation Organization.

(c) inoculation certificates.
(d) yellow fever vaccine, and meetings; it would necessitate the abrogation of authority over certain airfields, the staff of which would be directly responsible to an international organization.
G. Macdonald.

ROCA GARCIA M & BATES M. *Metodos usados en Colombia para el estudio del virus de la fiebre amarilla* (Study of the Yellow Fever Virus as carried out in Colombia). *Rev. Facul. de Med. Bogota* 1946 Aug v 15 No 2 89-122 14 figs 32 ref. English summary.

This account of investigations of the virus of yellow fever shows that the methods used in Colombia are the same as those which have been proved to be most serviceable elsewhere. The virus and its transmission are discussed, animal inoculation, titration, the maintenance of infected laboratory animals and insect and preservation of the virus are described in detail. The article is therefore a useful survey of the subject for those wishing to get a general grasp of the virus and the method of its study, but for readers of this *Bulletin* it contains nothing new.
H. Harold Scott

KOPROW M Hilary. Occurrence of Nonspecific Virus Neutralizing Properties in Sera of some Neotropical Mammals. *J. Immunology* 1946 Dec v 54 No 4 357-94 25 ref.

The mouse protection or neutralization test has been used extensively to

with the virus either by natural means or as the result of injection of vaccine. This also applies to monkeys and other related primates. On the other hand a number of species of animal including cows, goats, sheep, dogs etc. have been accused of being sources of false-positive reactions. In a recent immunity survey on forest animals in Brazil a high percentage of positive reactions was

far as is known do not occur in Brazil. In general similar results were obtained with all three viruses. Some of the sera of marsupials were also tested against

several instances the antiviral action against other viruses disappeared following the inoculation of yellow fever virus.

Three hours heating at 56°C failed to inactivate the non-specific neutralizing activity of sera.
F. O. MacCallum

LAIGRET Jean. Resultats de la vaccination contre la fièvre jaune après douze années de pratique. Results of Vaccination against Yellow Fever after Twelve Years Experience. *J. Bull. Acad. Méd.* 1947 v 131 Nos 1/2 13-17.

In this brief review Laigret draws attention to the benefits of vaccination against yellow fever in the epidemic and endemic areas. He considers that the disease is no longer a serious problem from the public health aspect and consequently economically in the French territories in Africa.

The mouse-brain vaccine of Tums and Dakar is said to produce little reaction and only rarely a serious reaction. Laigret however does not support the simultaneous smallpox-yellow fever intradermal vaccination as recommended by the French West African workers. He believes that the neurotropic properties of both vaccinia and yellow fever viruses may be enhanced if inoculated simultaneously and recommends a two week interval between their injection.

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and many others as far back as 1944, which clearly demonstrated that the jaundice was due to an iterogenic agent in the human serum used and not to the yellow fever virus.]

F. O. MacCallum.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

HARRIS, A. H. & DOWN, H. A. Studies of the Dissemination of Cysts and Ova of Human Intestinal Parasites by Flies in various Localities on Guam. *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 789-800, 2 figs.

An examination of the dejecta of flies caught on the island of Guam in the Pacific has shown, as heretofore, that these insects may be carriers of cysts of protozoa and eggs of helminths. Cysts of all the common intestinal protozoa (as well as *Trichomonas*) and eggs of hookworms, *Trichuris* and *Ascaris* were recovered, particularly from the large *Chrysomya megacephala* which has been shown to breed in human faeces. In one locality a collection of flies was found to yield no cysts or eggs, the result, it appeared, of the local latrine being burned out daily with gasoline. In general it seemed that the smaller predominating flies were able to pass through their intestines only the smaller cysts of the protozoa. It was demonstrated that cysts of *E. histolytica* were deposited

investigation and the species of fly involved.

C. M. Wenyon.

GREVITCH, J. & DELIGHTISH, J. Survival Time of *Entamoeba histolytica* in Feces. *Harefuah*. Jerusalem. 1947, Feb. 16, v. 32, No. 4. [In Hebrew 59-60. English summary 60.]

For many years, the authors, working in Jerusalem, have observed that trophozoites of *E. histolytica* in stools will survive up to 8 hours at room temperature. They therefore studied survival times under different conditions.

Stools from 16 patients, containing motile amoebae, were each divided into three parts, placed under the three different conditions shown below, and examined microscopically every three hours until no living forms could be found.

The survival times were as follows:—

(1) Incubator, at 37°C.; two to four hours.

(2) Room temperature, 25-30°C.; five to eight hours.

(3) Refrigerator, 6-8°C.; throughout the day; after 24 hours, a few weakly motile amoebae were found in two cases, and non-motile forms in five; the remaining nine specimens were negative.

While the immediate examination of a fresh specimen provides the best chance of diagnosis, this is not always practicable: the authors suggest that where transport to the laboratory is inevitable, results of examination are reliable if it is undertaken within 5 to 8 hours, including the time of transport. There is no advantage in keeping specimens at 37°C., but where immediate examination cannot be made, the stool may be kept in the refrigerator.

H. J. O'D. Burke-Gaffney.

BOURGAIN, M. Contribution à l'étude de la vitalité des spirochètes récurrents survivance de *Spirochaeta persica* Dschunkowsky 1912 en organes réfrigérés ou putréfiés de cobayes infectés expérimentalement. [Contribution to the Study of the Vitality of Relapsing Fever Spirochaetes surviving in the Refrigerated or Putrefied Organs of Guinea-pigs Infected Experimentally with *S. persica* Dschunkowsky 1912.] *Ann. Inst. Pasteur.* 1947, Jan., v. 73, No. 1, 84-6.

The author, with PIROT, previously recorded the survival of *Spirochaeta persica* in the organs of infected guinea-pigs [see this *Bulletin*, 1946, v. 43, 336]. The present note records the survival of the blood form for at least 19 days at +4°C., in the organs of infected guinea-pigs. Even at temperatures of 11° to 15°C., the spirochaetes survived for over 7 days, at 37°C. they did not survive for 4 days in infected organs immersed in physiological saline.

E. Hindle.

BERNKOPF, H., OLITZKI, L. & STUCZYNSKI, L. A. Studies on Bovine and Human Leptospirosis. *J. Infect. Dis.* 1947, Jan.-Feb., v. 80, No. 1, 53-63, 4 figs. [10 refs.]

The occurrence of bovine leptospirosis in Palestine was first recorded by Freund, Trainin and Malkin in 1941 (*Palestine Vet. Bull.*, No. 8, 153); the present paper deals with the transmission of this disease to calves and the isolation of a leptospira from the infected animals.

This disease attacks cattle, goats and sheep and produces symptoms ranging from a slight rise in temperature accompanied by reduction in milk yield, up to severe cases in which there is pronounced jaundice and blood in the milk; the animal may succumb with heart failure or convulsions. If the animal recovers, it may be months before it returns to normal health and milk production. In pregnant animals, abortion nearly always occurs, even in mild cases.

Blood, milk and urine of heavily jaundiced cows were injected into 7 to 10-day-old calves without any results, but infection was finally obtained by the injection of blood from a cow in the pre-icteric stage. The first calf infected in this way became jaundiced after 10 days and died the following day. Six consecutive passages were made in calves, in every case the blood being taken from the jugular vein about the 10th day of the infection. The 13 calves infected showed very different clinical features. Fatal jaundice appeared in 4 out of 8 animals in the first 3 passages, 3 died non-jaundiced, 1 in the 3rd passage and 2 in later passages, the other 6 recovered.

Leptospirae were demonstrated in Levaditi-stained sections of the liver and kidney of animals of the first 3 passages and the organisms were isolated in pure culture with the use of Noguchi's semi-solid medium. It is of interest that blood was drawn from an infected animal and inoculated into culture tubes on 11 successive days; but only one tube inoculated on the 9th day became positive, and then only after an incubation of 7 days at 30°C. Under identical conditions the bovine strain did not grow as well as strains of *L. icterohaemorrhagiae*, isolated from a rat, and *L. canicola*, from a dog.

The serum of infected cows and calves, one month after recovery, agglutinated the bovine strain up to a titre of 1:5,000; but agglutinated the dog and rat strains only to 1:40 to 1:80. Serum from normal animals even at a low dilution, 1:20, did not agglutinate the organisms.

The bovine strain is said to infect human beings: in Palestine, although no strain has yet been isolated from man, severe cases of jaundice with early kidney involvement are known to occur. The sera of 19 such persons were tested and all agglutinated the bovine strain in high dilutions ranging from 1:1,280 to 1:25,000. All these patients belonged to occupational groups

Camaguey and Oriente and the constituent figures for the different municipalities in each here we can only summarize the findings —

Ambulatory Patients

Municipality	Males	Females	Total	Number per 10 000 (June 1946)
Pinar del Rio	43	23	66	1.63
Havana	295	200	495	3.97
Matanzas	85	48	133	3.68
Las Villas	231	146	377	3.91
Camaguey	158	120	278	5.62
Oriente	421	396	817	6.0
Total	1 233	933	2 166	4.5

Hospital Patients

Municipality	Males	Females	Total
San Lazaro	243	82	325
San Luis de Jagua	197	114	311
Total	440	196	636

Deaths 1936-46

	Males	Females	Total
In hospitals	349	107	456
At home	52	27	79
Total	401	134	535

H. Harold Scott

IBARRA PEREZ R & GONZALEZ PRENDES M A Incidencia de la lepra y ocupaciones [Occupation and the Incidence of Leprosy] *Rev. Sifilografia, Leprologia y Dermatologia* Matanzas Cuba 1946 Oct. 3 No. 4 159-65 [12 refs.]

The incidence of leprosy

single case and in 78 the number is less than ten. The greatest incidence 723 (25.3 per cent) was among women working at home next come agricultural labourers 430 (16.6 per cent) retired or of no occupation 231 (8.3) day labourers 180 (6.3) students 171 (6.0) officials 114 (3.8) and traders 103 (3.5). In their summary the authors state that the incidence is highest among those of a social class which has generally a low standard of living [a conclusion fairly obviously deducible without an elaborate analysis of occupation].

H. Harold Scott

FEDERICO GUILLOT, C. & OSVALDO CURCI, A. Embarazo y lepra. Consideraciones acerca de la lepra en los estados fisiologicos femeninos. [Pregnancy and Leprosy. A Study of Leprosy in Physiological Conditions in Women.] *Rev. Argentina Dermatosisifilogia*. 1946, July-Dec., v. 30, Nos. 3/4, 313-21. [13 refs.]

That males are infected with leprosy in greater numbers than are females is a fact generally acknowledged. DINIZ, analysing 82,821 cases, found 57,008 male and 25,813 female, or 2.2 : 1, and the authors found among 5,705 Argentine lepers 3,682 males, 2,023 female, or 1.82 : 1. In Norway, it is true, female cases predominate, but in that country there are no new cases and the preponderance is ascribed to the greater length of life of the women. Predominance in males

female sex. In the young, where exposure is the same for boys as for girls, the numbers are closely alike.

After these preliminary statements, the authors pass on to consider in more detail leprous infection in women. Examination of 200 female lepers revealed *vulval lesions* in 13 per cent. THIROUX found Hansen's bacillus in the vaginal secretion in 27.2 per cent. of those with the lepromatous form of the disease, "much less in other forms." But it is acknowledged that the acid-fast organisms may be of the "smegma type" and not Hansen's organism. The uterus may itself show lesions and KOBAYASHI found the bacilli in the ovaries of six patients in an advanced stage of the disease. Infection of the breasts is not uncommon and organisms indistinguishable from *Myc. leprae* may be seen in the milk. As regards menstruation, leprosy infection in pre-puberty years may retard the onset, and during puberty may suspend the menses. On the other hand, menstruation may precipitate the leprotic reaction. Next, *fecundity*; the relatively small number of births to lepers is, probably, not due to lowered fecundity but to the fewer opportunities for sexual congress or to precautionary measures taken. As for pregnancy itself, the drain on the system lowers resistance to disease and the history of leprosy appearing during or soon after pregnancy or parturition is not infrequent. The leprosy does not appear to affect pregnancy adversely, nor parturition, but the reverse is to be observed; the exhaustion of the latter may lead to exacerbation of the disease, but not in the tuberculoid form.

a third had a lepromatous reaction [time not stated] and a fourth had a similar reaction in the fifth week. [An interesting study.] H. Harold Scott.

HALLBERG, V. A New Method for Staining Leprosy Bacilli. *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 67-73, 2 coloured figs. on 1 pl.

In 1941, the writer published a new method of staining tubercle bacilli with Nachtblau to take a dark blue colour. By the same means, lepra bacilli were detected in thick films of leprous venous blood. Lepra bacilli preparations preserved for years also took this stain, as did those of old cultures of various acid-fast bacilli, which do not stain well by the Ziehl-Neelsen method. The new method is particularly valuable in staining sections of tissue containing lepra bacilli. For details of the various solutions used the original paper must be consulted by those interested, for they occupy three small-printed pages, but

factum. Plenty of the solution is poured on to the slide heated to boiling and left for five minutes. The stain is poured off the film which is decolorized with a solution of 25 per cent HCl (3 cc) and 100 cc of 70 per cent alcohol until no more blue clouds are given off. The preparation is washed in distilled water and counter stained for 5-10 seconds with either neutral red, carbolfuchsin, resurin or bismarck brown. Alternative methods are also given. A coloured plate illustrates the results.

L. Rogers

McDONALD S. The Laboratory Diagnosis of Leprosy. *Trans Roy Soc Trop Med & Hyg* 1947 Mar & 40 No 4 451-6 3 figs on 1 pl

This is a timely paper on diagnosis of early cases of leprosy seen among recruits for the Indian Army. Before the recent war most Indian Army men were obtained from the Punjab where leprosy is comparatively rare but with recent recruitment from all over India many cases have been found the early recognition of which is important. Many will be negative bacteriologically and the lepromin test is of little diagnostic value and lepromin is not always available. In such cases the author advocates microscopical examination of a small piece of the suspected skin lesion which has been removed under a local anaesthetic. Such examinations were carried out in 174 suspected cases of leprosy. In 100 cases the results were as follows: 100% of the cases showed a positive result and a few giant cells as a rule together with characteristic degenerate nerve fibres surrounded by

are illustrated by three micro-photographs. The nerve fibrils can be well shown by staining with Weigert's iron haematoxylin followed by Ponceau R acid fuchsin and counterstaining with light green or very dilute Masson's aniline blue with resulting deep pink nerve fibrils standing out against a green or blue background. While the author considers that skin leprosy affords the most rapid confirmatory evidence of the type of tuberculoid leprosy seen he points out the need for expert interpretation of sections since skin tuberculosis cannot be differentiated with absolute certainty on histological grounds alone.

L. Rogers

CARROVELL M & CONTRERAS DUEÑAS. Exploración objetiva de los trastornos nerviosos iniciales de la lepra. Objective Testing for Early Nerve Disturbances in Leprosy. *Revista Fontilles* Valencia 1946 July, No 5 403-6 1 pl

In children and in older persons of low intelligence little reliance can be placed on responses to tests of nerve function.

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of the

starch powder. In a healthy skin the iodide of starch reaction is very obvious in 4-6 minutes; its absence in diseased areas indicates secretory defect due to nerve lesion. They next compare the action of histamine with that of Priscol, a substance the composition of which is not stated but which acts on the small arteries and arterioles rather than, like histamine, on the capillaries. Drops of this are placed on skin which is apparently healthy and on adjacent parts which are thought to be diseased and the skin is pricked with an ordinary hypodermic needle but *not deep enough to draw blood*. This is important, because not only are the nerve terminals in the skin acted upon, but also the vascular endothelium leading to a direct vasodilator action and a false positive result. Comparing Priscol with histamine, the initial erythema appears sooner, the secondary, reflex, erythema more quickly, and the third phase, the papule due to increased capillary permeability, earlier in the skin under the histamine drop than in that beneath the Priscol. Also the histamine papule is devoid of colour and shiny in the centre, whereas that of Priscol is more rounded and erythematous.

H. Harold Scott.

FAGET, G. H. Alopecia Leprosa in the United States. *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 42-8, 5 figs. on 2 pls. [10 refs.]

"Alopecia is not a rare complication of leprosy in the United States. The presence of 10 definite cases among 360 patients (an incidence of 2.86 per cent.) demonstrates this fact.

"Alopecia leprosa occurs mostly in far advanced lepromatous disease of long duration."

POGGE, R. C. & Ross, Hilary. Erythema Nodosum in Leprosy. A Study of the Pathogenesis with reference to Carbohydrate Metabolism. *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 49-54. [19 refs.]

This paper deals with the pathology of evanescent red nodules appearing during lepra reactions, which closely resemble erythema nodosum associated with tuberculosis and streptococcus infections. At Carville, Louisiana, 46 per cent. of lepromatous cases had shown lesions in the past and 25 per cent. more during the previous two months. Mixed cases showed similar numbers, but among neural ones only 22 showed past and 11 per cent. recent lesions. Cases are, however, less frequent in patients treated by promin or diasone and in these cases the lesions tend to improve. Changes in carbohydrate metabolism in leprosy in relation to such lesions have been studied in 39 patients suffering from acute manifestations of leprosy, in 24 of whom erythema nodosum was observed, accompanied by chills and fever. Another 13 showed acute neuritis and 2 leprosy lymphadenopathy. In all but the mildest cases, a definite increase in the fasting blood sugar was found. This hyperglycaemia in acute leprosy differed from that of other acute infections, in that it is essentially a rise in the glucose tolerance curve after a normal fasting sugar: in the present cases, the fasting sugar was elevated. None of the patients had suffered from glycosuria. Bile pigments in the urine were studied by the methylene blue test in 44 acute reactions, which gave positive tests in 72.7 per cent. such cases, as compared with 50 per cent. in non-reacting cases. Seven had previously showed negative bile tests, and they reverted to negatives when the reaction was over. It is thus likely that hyperglycaemia in acute leprosy is related to metabolic functions of the liver. Further, 35 patients with only chronic symptoms showed normal fasting blood sugar. In 40 cases of lepra fever, protomine zinc insulin was given in daily doses of 25 to 40 units for three days, with resulting clinical improvement and rapid subsidence of severe pain in neuritis cases L. Rogers.

FAGET G H POGGE R C JOHANSEN F A FITE G L PREJEAN B M &
GEMAR F Present Status of Promin Treatment in Leprosy *Internal J*
Leprosy Cleveland Ohio 1946 Dec v 14 30-36 1 fig [10 refs]

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Of 137 remaining patients who have been treated regularly 103 or 75.3 per cent were lepromatous 29 per cent neural and the rest mixed.

Ulcers which heal treatment and the gratifying results. Eye complications have greatly decreased under this drug. It is also of use in leprosy laryngitis and no tracheotomy has been required during the last three years at the Leprosarium.

Bacteriological improvement has been equally apparent during the last three years and 51 per cent of patients have been passed by the Parole Board and a further 87 per cent have had six or more consecutive monthly negative examinations for lepra bacilli.

It is results in improvement in all accompanied by bacteriological and bacteriological improvement. L. Rogers

MOY A M Quimioterapia de la lepra con promin [Promin in the Treatment of Leprosy] *Prensa Med Argentina* 1946 Nov 29 v 33 No 48 2390-404 12 figs [12 refs]

The work of FAGET and his collaborators on the treatment of leprosy with promin has been referred to in this *Bulletin* [1944 v 41 494]. Since then FAGET and POGGE have made a second communication [this *Bulletin* 1946 v 43 343]. The drug is put up in 12.5 cc ampoules (5 gm) and saline solution for 4 months results a

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... d nodules, diminution of
 ... of the bacteria. Thirty-
 ... 30 had improved, 6 were
 stationary [one is not accounted for] and of 12 who had had 5-10 months' treatment five improved, six remained stationary and one was worse. The fact must not be omitted that all received a minimum of 500 mgm. of ascorbic acid intravenously each day. The promin action may be accompanied by a haemorrhage these yield to preparations of the disease; it had states briefly that study is being undertaken of combined treatment by promin and chaulmoogra oil in large doses intramuscularly and by mouth, and "first impressions are that the results are better than with promin alone." Illustrations of patients show well the changes effected by the use of promin. H. Harold Scott.

FERNANDEZ, J. M. M. & CARBONI, E. A. The Action of Diasone in the Treatment of Leprosy. (Preliminary Report.) *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 19-29, 8 figs. on 2 pls.

After references to previous trials of sulphones, the authors record their experience with diasone orally in 42 cases, in which at least one series of treatment had been completed. The drug is put up in 5-grain capsules, one of which is first given daily by the mouth and increased progressively to three or more. As it tends to produce anaemia and its concentration in the blood tends to decrease after 6 to 8 weeks' treatment, the authors advise giving the drug daily

capsules containing 2 grammes. As reactions may be produced, constant supervision of the patients is necessary. With the exception of severe anaemia in one patient, no serious complications have been seen. Intolerance is most frequently seen after two weeks. It disappears with temporary suspension of the treatment or the administration of liver, iron and vitamin B complex. Asthenia and depression or a cyanotic colour due to the formation of met-haemoglobin are also seen. Headache, nausea or loss of appetite and other reactions were noted in 74.2 per cent. of the patients. A general improvement in health occurred in many of the cases. In 29 of 35 cases, or 82.8 per cent., there was a fall in the blood count varying from 500,000 to 2,000,000, usually after 20 gm. of the drug had been given; in all but one it responded to anti-anaemic treatment, in the remaining case a blood transfusion was required. Only slight falls in the leucocytes were noted, but they should be watched for.

The results of this trial are given in a table. Most of the cases were advanced lepromatous ones; only a small number were L_1 or N_s cases. After one course of treatment in 26 cases, 13 were unchanged, 10 improved and 3 much improved. After two courses in 11 cases 4 were unchanged, 5 improved and 2 much improved, but all of 5 cases were much improved after three courses of the drug.

Bacteriological examinations did not show disappearance of the lepra bacilli, but granular forms predominated. As the result of eight months' treatment, the bacteria became worse and in nearly 60 per cent. increased with the duration of the treatment.

is a great advantage in such a chronic disease as leprosy. Further experience is required to enable definite conclusions to be reached regarding the value of the diason treatment. L. Rogers

MON A M & BERNAL Maria. Influence of Tyrothricin in the Sterilization and Cicatrization of Leprous Ulcers. Report of Treatment in Fifteen Patients. *Internat J Leprosy* Cleveland Ohio 1946 Dec v 14 7 18 8 figs on 2 pls

Tyrothricin is a mixture of two polypeptides gramicidin from *Bacillus brevis* which is highly bactericidal for Gram positive micro-organisms only. It is also active and Gram negative on the kidneys and liver. It can only be used for local application and not parenterally so it has been tried in the treatment of leprosy ulcers.

distilled water). With this leprosy ulcers are sprayed by an atomizer daily for the first week and then every second day for from 32 to 138 days after cleansing the ulcers at first with warm saline solution. The ulcers are then covered with sterile gauze and any exuberant granulations treated with silver nitrate. If a patient has less than 4 000 000 red corpuscles per cmm liver extract and ferrous salts are given. Vitamin C may also be given.

Fifteen patients were treated in whom ulcers had been present for from 1 to 15 years. From the first application the preparation had a remarkable analgesic effect. In six of seven cases with frequent previous attacks of erysipelas these did not recur and in the seventh only on one occasion. More rapid clearing up and cicatrization took place than with any other treatment. Bacterial sterilization of the ulcers was obtained in 10 to 35 days including disappearance of *M. leprae* after 10 to 21 applications. However *in vitro* tests did not afford any evidence of a bactericidal effect of the preparation on the lepra bacilli. Short notes of the cases are recorded. They show complete

the condition before and after treatment in four cases are recorded. L. Rogers

LANGUILLON J. *
 tions intra m
 Leprous Plan - 1
 Angioxyl] *Bull Soc Path Exot* 1946 v 39 Nos 9/10 339-41
 Six cases of very chronic plant lesions treated with Angioxyl

success by twelve injections of forty units of angioxyl intramuscularly and the seventh case was presumably treated by the same drug although this is not explicitly stated. The healing effects of the drugs were very marked.

L. Rogers

CHALA, J. I. Control of Leprosy in Colombia. *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 60-66, 1 pl.

The control of leprosy in Colombia is based on the general belief that it is a communicable infectious disease, either through direct or indirect contact. Isolation of all open cases is carried out in leprosaria, at home or in special hospital wards. Closed ones are treated by physicians in dispensaries or by the National Health Department. Healthy children of leprosy patients are cared for. Information on preventive measures is disseminated and research carried out at the Federico Lleras Acosta Institute. The large leprosarium at Agua de Dios was founded in 1870 at 1,350 feet above the sea in a dry climate. It accommodates 4,484 patients and about 5,000 healthy persons; eight physicians are employed including specialists. At Contratación, there are 2,296 patients and about 4,000 healthy persons; and at the island settlement of Cano de Loro, founded as early as 1791, there are 506 patients and 200 healthy persons. Thus there are 11,730 healthy persons in the leprosaria, contrary to law, including many children. Patients frequently escape, and there are many marriages and births. The cost of isolation is a severe tax on the treasury, yet the leprosaria do not at present provide an adequate prophylactic service. Moreover, 189 open cases are isolated at home under supervision.

In 1932, a new law provided for an anti-leprosy programme for isolation of all open cases and the treatment of closed ones at dispensaries of which there are now 11. Healthy children, who number 2,530, are to be removed from the leprosaria. Among 1,048 children of lepers, who have already been looked after in separate institutions, only 12 have yet developed the disease. Chaulmoogra preparations are used in treatment; with their use, about 54 per cent. improve, 34 per cent. remain stationary and 12 per cent. become worse. The health authorities propose completely to reorganize the methods of control and the present leprosaria.

L. Rogers.

SUAREZ, J. National Leprosy Service in Bolivia. *Internat. J. Leprosy*. Cleveland, Ohio. 1946, Dec., v. 14, 55-9.

HELMINTHIASIS.

MARKELL, E. K., MULLINGER, P. E. & SCHNEIDER, D. J. Intestinal Parasitic Infections In Naval Personnel. *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 63-5.

The authors studied the stools of 1,153 members of the U.S. Forces, and of 103 civilians, in the School of Tropical Medicine at the Naval Hospital, Treasure Island, and were satisfied that the series represented a random selection of the patients. Direct-smear, concentration and staining methods were employed.

The percentages of intestinal parasites found and the "Theoretical Percent. Infection" for the various amoebae are given in two tables, each group of patients being recorded separately.

Among the naval and marine patients, 40.3 per cent. were infected with more than one parasite. Over 80 per cent. of the civilians grouped harboured one or more parasites.

Detailed figures are given in respect of the protozoal and helminthic parasites encountered, and their significance is discussed.

H. J. O'D. Burke-Gaffney.

were demonstrated in the stools of 144 of them sera from 391 were negative but ova were found in 5 of them. Of these 560 men 195 had previously been regarded as infected and given treatment of the 363 previously regarded as not infected 34 (9.3 per cent) had a positive test and 27 (7.4 per cent) showed ova. 26 of the 27 with ova had a positive test. Persistence of a strongly positive test (7 M.H.D. or over) for 6 months after treatment is evidence of persisting infection. No false positive results were found.

This test therefore is of outstanding value in diagnosis and is more sensitive and less tedious than repeated examination of the stools for ova. It is therefore an essential part of an investigation of any outbreak but both tests are necessary to determine the true incidence of the disease. If the test remains positive and eggs cannot be found the explanation may be that the infection is predominantly or exclusively with male worms.

The original antigen was prepared 18 years ago in India but was still active another antigen recently prepared in somewhat the same manner had almost equal potency.

Charles H. Storks

TILLMAN A. J. B. Schistosomiasis Japonica with Cerebral Manifestations
Report of Seven Cases *Arch Intern Med* 1947 Jan; 79 No 1 36-61

The author briefly traces the life-history of *S. japonicum* noting that in their passage from skin through the systemic circulation to the mesenteric veins the larvae may give rise to a patchy pneumonic condition which though not recognized clinically is often suggested by the patient's history. Ova from the mature worms in the mesenteric radicles often reach the liver but may also pass to the systemic circulation through the haemorrhoidal plexus and thence to the lung and the general circulation and to distant organs. It has been said that adult *S. mansoni* may migrate and be carried to the pulmonary arteries and the same may possibly be true of *S. japonicum* though it has not been proved. Ova may be deposited in the tissues of the central nervous system and produce severe lesions there. The author gives details of 7 cases in which this presumably happened but since none of the patients died,

troops. Very full accounts are given of the laboratory findings and clinical condition of these men. Ova were found in the faeces of 4 of them (but the stools may be negative many times before eggs are found). leucocytosis (16 500 to 27 400) and eosinophilia (10 to 61 per cent) were constant. Prodromal symptoms included fever, cough, malaise, oedematous rash, pain in chest or abdomen. the cerebral manifestations included headache, disorientation, lethargy, confusion, paraplegia, triplegia or quadriplegia, involvement of the cranial nerves and various mental changes. Aphasia, amnesia, blocking, confusion, disorientation, defective memory and coma were outstanding. Spasticity occasionally early flaccidity changing to spasticity, rigidity, hyperreflexia, pathologic reflexes and loss of superficial reflexes were common to all. Spinal fluid was examined on 11 occasions but was always normal.

It will be noted that the diagnosis of schistosomiasis was made on clinical findings only in some of these patients. The author considers that this disease should be suspected in a patient exposed to infection and presenting an urticarial eruption (in a previously non-allergic person), pulmonary symptoms, vague abdominal aches, leucocytosis over 15 000 and eosinophilia of 40 per cent. Cerebral involvement is indicated where the nervous signs named above appear. The condition must be differentiated from other worm infestations.

The treatment of *S. japonicum* infection is in a state of flux; the author gave Fouadin (45 cc. or more, in 17 days) and potassium antimony tartrate (1 per cent. solution intravenously; the limits of dosage are not clearly indicated). He found that the latter drug produced considerable electrocardiograph changes, but without clinical evidence of cardiac involvement. These were beneficial in the cerebral cases, but did not effect complete cure, because there were still symptoms after drug treatment was ended, the permanence of which cannot yet be assessed.

Charles Wilcocks.

LIPPINCOTT, S. W., PADDOCK, F. K., RHEES, M. C., HESSELBROCK, W. B. & ELLERBROOK, L. D. Tests of Liver Function in Schistosomiasis Japonica with particular reference to Antimony Treatment and with Report of Two Autopsies. *Arch. Intern. Med.* 1947, Jan., v. 79, No. 1, 62-76, 8 figs. [Refs. in footnotes.]

Two American soldiers, infected with *S. japonicum* on the island of Leyte and given treatment with Fouadin or potassium antimony tartrate, died from other causes and were brought to autopsy. In one, small abscesses were found in the submucosa of the intestine, without ulceration, from the jejunum to the descending colon, and in the liver. These were, presumably, reactions to ova of the worms. In the other, abscesses were found in the liver, small and circumscribed, but not in the intestine. They were not numerous enough to suggest that they would have impaired liver function.

In a group of 481 soldiers similarly infected, tests of hepatic function were made, during and after treatment, by the following tests, the percentages of abnormalities are given in brackets:—globulin (5), formol gel (1), icterus index (4), serum bilirubin (6), urobilinogen (nil), hippuric acid (5), galactose tolerance (4), and bromsulphthalein retention (12). Repeated bromsulphthalein and serum bilirubin tests showed a definitely increased incidence of mild abnormalities toward the end of, and after, treatment with trivalent antimonials; this persisted for 90 days or more after the end of treatment, but decreased later. The evidence suggests that antimony treatment has a minor direct or indirect effect on the liver.

Charles Wilcocks.

EL KORDY, M. I. On the Incidence of Hydatid Disease in Domestic Animals in Egypt. *J. Roy. Egyptian Med. Ass.* 1946, July-Aug., v. 29, Nos. 7/8, 265-79, 4 figs. [14 refs.]

A survey of the incidence of hydatid disease in camels, buffaloes, cattle and sheep slaughtered in the Cairo abattoir, revealed that the highest rate of infection occurs in camels (31 per cent.) and the lowest in sheep (1.5 per cent.). Buffaloes (16 per cent.) and cattle (10 per cent.) show a moderate infection rate. The average number of hydatid cysts was found to be nearly the same in each kind of animal, namely 3.5 and 4. Multilocular and multicystic cysts occur, but are rare. The highest percentage of fertile cysts is found in camels (68.42 per cent.) and in sheep (63.64 per cent.), for this reason, together with its relatively high infection rate, the camel is considered to be the optimum intermediate host in Egypt. Buffaloes are ranked next in importance with an incidence of 16 per cent. infection and a percentage of fertile cysts of 51.18 per cent. Various organs may be infected, but cysts are most commonly found in the liver and lungs where their occurrence varies in different kinds of host. In camels, the lungs are more frequently infected than the liver while the reverse holds in the case of buffaloes, cattle and sheep.

From the results of precipitin and complement fixation tests for the diagnosis of hydatid infection in camels it is concluded that these tests cannot be relied upon when applied to domestic animals.

J. J. C. Buckley.

COLE G The Australasian Hydatid Registry *Health Bull* Melbourne 1945
 July-Dec Nos 83/84 2255-61

This valuable collection of recorded cases of hydatid disease in Australia

precincts of the Royal Australasian College of Surgeons Melbourne

Up to 31st March 1945 1802 cases had been recorded of which 871 were from New Zealand and 931 from Australia Of the latter 350 were recorded as being from Victoria geographical and other data concerning these are tabulated Thus 58.5 per cent of the cases are males 41.5 per cent females In the age group under 20 there are 18.5 per cent males and 16.5 per cent females in the age group 21-60 66.8 per cent males and 73.1 per cent females

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Concerning the sites of the cysts in the 1802 cases on the Register the following figures are given liver (including secondary peritoneal) 1140 cases lung 441 muscle and fascia 82 bone (including spine) 46 kidney 39 spleen 23 brain 16 heart 6 thyroid 2 breast 3 parotid 1 prostate 1 pancreas 1

J J C Buckley

DORRANCE G M & BRANSFIELD J W The Evaluation of the Surgical Treatment of Recurrent Echinococcal Cysts of the Liver followed by Deep X-Ray Therapy *Arer J Trop Med* 1947 Jan v 27 No 1 77

Report of a case with successful result

GELLHORN A ROSE H M & CULBERTSON J T The Plasma Antimony Concentration and the Urinary Antimony Excretion in Man during Therapy with Organic Antimony Compounds *J Trop Med & Hyg* 1947 Feb v 50 No 2 27 31 2 figs

Therapy with organic antimony compounds

concentration and urinary excretion in the treatment of 1946 v 43 763] The patients infected with

It has been found that some of the patients infected with

was studied on 24 hour samples in 5 patients two of them had leishmaniasis and the remainder *B. bacilliformis* infections All the patients appeared to be in good health at the time of the experiments

The rhodamine B method as used by GELLHORN *et al* (*J Pharm & Exper Therap* 1946 v 87 159) was employed in the antimony estimations After treatment with the trivalent compounds or with Stibosan less than 0.05 mgm Sb was present in 100 ml of plasma The highest plasma level of Sb after Neostibosan was 1.05 mgm and after Neostam 0.18 mgm in the same volume of plasma although the amounts of Sb injected were not very different in the two cases The reason for the lower plasma levels after treatment with trivalent compounds was partly explained by the smaller amount of Sb given but this was not the whole explanation The high level of Sb in plasma after Neostibosan suggests that this might be the drug of choice in treatment of

blood parasites. A greater absolute amount and much higher percentage of administered Neostibosan was excreted in the urine than was the case with Fouadin, so that in the case of impaired renal function during therapy with the former substance a rapid accumulation of Sb in the body could be expected. The known greater toxicity of trivalent compounds was confirmed.

J. D. Fulton.

CLARK, W. B. Onchocerciasis in Guatemala: A Preliminary Report. *Arch. Ophthalmology*. 1946, Nov., v. 36, No. 5, 644-5.

A study of 1,215 patients.

SHOOKHOFF, H. B., BIRNKRANT, W. B. & GREENBERG, M. An Outbreak of Trichinosis in New York City, with special reference to the Intradermal and Precipitin Tests. *Amer. J. Pub. Health*. 1946, Dec., v. 36, No. 12, 1403-11, 1 fig. [25 refs.]

The authors investigated the largest outbreak of trichinosis in the history of New York City Health Department, which occurred in 1945. After eating pork from a single wholesaler, 84 persons became ill and the pork eaten by 53 of them was traced to a single retail store. The pork had not been subjected to the usual freezing process. The outbreak was the largest in the history of the United States, Germany, England and Norway since 1900.

The incubation period of 62 persons during the present outbreak varied from 2 to 35 days. In 46 of them (74 per cent.) the first symptoms occurred between the fifth and the seventeenth days. None of them was critically ill and none died. A table indicates that deaths occurred in only 12 of the other outbreaks listed since 1900. The mortality in the four largest of these outbreaks, totalling more than 100 persons, was less than 1 per cent. The authors discuss the mortality in these outbreaks and point out that the comparatively few deaths among them contrast markedly with the mortality experienced during the last century (see GOULD, *Trichinosis*, Chas. C. Thomas, Springfield Ill., 1945, p. 279). The authors believe that the reduced severity of trichinosis is due to reduction in the dosage as a result of public health and other control measures and to improved eating habits. In the outbreak reported and in all but two of those which have occurred since 1900, the disease has been acquired from sausage, which dilutes the pork and is itself diluted with liver, blood, etc., scraps from many pigs being used. In Stuttgart, when steaks of polar bear meat were the cause of an outbreak, 12 out of 88 infected persons died.

The symptoms are recorded in a table. By far the commonest were oedema of the eyelids (81 per cent.), muscle pains (72 per cent.) and fever (71 per cent.). The order of the appearance of the symptoms is discussed. Only 7 out of 57 persons had classical gastro-enteritis.

Eosinophilia was studied by means of differential counts done on 72 persons. The authors regarded 10 per cent. or more of eosinophils as an eosinophilia, but state that counts under 10 per cent. cannot be ruled out unless the total number of white cells is considered. A table shows that 64 of the 72 persons examined had more than 10 per cent., and of the eight others only one had less than 5 per cent. In 9 of 18 outbreaks since 1900 all those affected had an eosinophilia and in 9 others most of them had. The authors state that it is "generally accepted that determination of the eosinophil count is the most useful single laboratory test for the early diagnosis of trichinosis." The precipitin reaction was done on 40 out of the 84 persons. Only two of these were completely negative. In five the titre was 1:160 (doubtful positive); the remainder varied from

1 320 to 1 1 280 The earliest positive was found on the 7th day of the illness. The authors believe that practically all subjects eventually develop a positive precipitin test but that it may be developed too late to be of practical value. The test is however valuable as confirmation of clinical evidence although false positives are not infrequent.

The intradermal test was done on 21 persons. Only 11 of them were positive. The earliest test was

the intradermal test becomes positive during the third week after infection and that the precipitin test first appears at the end of the fourth week but they

more often positive during the later weeks. In 12 cases they did both tests simultaneously and repeated this on two persons. From the results shown in a table they conclude that the precipitin is the more useful test of the two and has the advantage that it is easier for the practitioner to send a blood sample for test than to do a skin test at the bedside with perhaps a second visit to read a possible delayed reaction but the intradermal test gives fewer false positives. It is best to use both.

No biopsies were done. The authors believe that biopsy has less value than the precipitin and intradermal tests. It is not readily repeated so that it must

biopsies were done and only 39 were positive

G Lapage

DEFICIENCY DISEASES

SMITH D A Nutritional Neuropathies in the Civilian Internment Camp, Hong Kong, January, 1942 August, 1945 *Brain* 1946 \ 69 No 3 209-22
3 graphs [40 refs]

Among the civilian internees in Hong Kong there were many hundreds of cases of subacute wet beriberi, burning feet syndrome and amblyopia. There were a few cases of typical dry beriberi. In this paper the clinical features and response to treatment of these syndromes are described and their incidence discussed in relation to diet and to the prevalence of other deficiency states. The diet throughout was grossly deficient in animal protein, B vitamins, calcium and phosphorus.

Subacute Wet Beriberi—The diagnosis was only made in the presence of oedema, neurological signs and a rapid response to treatment with vitamin B₁. In most cases there was tenderness of the calves and over the nerve trunks on pressure. Response to treatment with synthetic vitamin B₁ was uniformly satisfactory. There were 844 cases out of a population of about 2 500. There was a close correlation between the incidence of beriberi and the vitamin B₁ carbohydrate ratio of the diet. It is suggested that the critical value of this ratio below which symptoms developed was 0.4 mgm per 1 000 non fat calories.

Chronic Dry Beriberi.—Only 6 cases were seen, with flaccid paraplegia and absent reflexes. Response to treatment with a mixture of synthetic B vitamins was more rapid than to vitamin B₁ alone.

"Burning Feet" Syndrome.—There were in all 756 cases of this condition. The characteristic features were "pins and needles" in the feet, shooting pains, and aching of the feet and legs. The pain was worse at night. It was usually described by the sufferers as a sensation of intense burning or freezing. No changes in skin temperature or vasomotor abnormalities were detected. In some cases there was plantar anaesthesia, in others hyperaesthesia. Reflexes were exaggerated in the early cases, but later, as anaesthesia developed, the ankle-jerks and then the knee-jerks were lost. These latter findings were present in 35 per cent. of the cases, and are attributed to a mild degree of chronic dry beriberi, since treatment of the "burning feet" syndrome with vitamin B₁ caused improvement, but not freedom from pain, in the same proportion of cases. [It is not stated whether the patients who improved were those with anaesthesia and loss of reflexes.] The response to treatment was, in general, disappointing; neither vitamin B₁ nor nicotinic acid gave significant relief from pain. Slow improvement was observed when yeast were added to the diet, closely correlated with that well as nicotinic acid, has attributes the condition to deficiency of some other member of the vitamin B complex. The work of GOPALAN [this *Bulletin*, 1946, v. 43, 763] suggests that the factor concerned may be pantothenic acid.

Amblyopia.—This condition had a total incidence of 14.8 per cent. The outstanding symptom was loss of visual acuity. In all cases there was a paracentral scotoma, larger for red than for black and white, with constriction of the visual fields for colour discrimination. Ophthalmoscopy revealed degenerative pigment changes round the macula in 10 per cent. of the patients, and optic atrophy in 1 per cent. Temporal pallor of the disc was present in 25 per cent. but was not considered significant, as it was also found in normal persons. There was some correlation between the incidence of amblyopia and that of "burning feet" and ariboflavinosis. The response to treatment was similar to that of "burning feet". Vitamin B₁ and nicotinic acid were ineffective, but 14 out of 15 patients improved with multivitamin capsules containing in addition riboflavin, pyridoxin, and pantothenic acid. Ground-nuts, beans, rice-polishings, and yeast also had some beneficial effect. All these substances are good sources of the B vitamins; the author considers, however, that the possibility of an essential amino-acid deficiency must also be borne in mind.

J. C. Waterlow.

GRAVES, P. R. Pellagrous Encephalopathy. *Brit. Med. J.* 1947, Feb. 15, 253-6.

During the last year a number of reports have recorded, among released prisoners of war from the Far East, a condition of spastic paraplegia as the

and which varied in severity from a condition of deep and fatal coma to a chance-discovered extensor plantar response. Similarly the ultimate state of the patients varied from complete recovery to a paralysis so severe as to render some patients bedridden.

The outstanding and constant finding was evidence of pyramidal involvement, usually affecting the lower limbs. There were absent abdominal, and exaggerated tendon reflexes, spastic weakness in most cases, clonus, and an extensor plantar

response
cases the
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was also prevalent in the camp. The main mental changes were general dulling and slowness with loss of emotional control. Mucocutaneous lesions attributable to ariboflavinosis were present in about one-third of cases and a similar proportion had suffered from painful feet syndrome.

The course of the illness appeared to be uninfluenced by the treatment available which was very limited but which included vitamin B₁ and nicotinamide.

There were six fatal cases and in the four of these upon whom necropsy was performed there were found macroscopically small translucent areas 2-3 mm in diameter in the white matter of the cerebral hemispheres. No changes in the cord or meninges were apparent to the naked eye. Microscopical investigations were impossible.

The association of the other known B complex deficiency lesions both in individual cases and in general incidence rates leads to the conclusion that this spastic syndrome is a manifestation of deficiency in some member or members of the B complex.

[This thorough and detailed description is a valuable contribution to knowledge of the neurological effects of malnutrition. The name given to the syndrome described is open to dispute and may give rise to confusion. CLECKLEY SYDENSTRICKER and GEESLIN (this Bulletin 1940 v 37 442) and JOLLIFFE and his associates (J Amer Med Ass 1940 v 114 207).

B complex deficiency syndrome the word is quite commonly used as synonymous with *Nicotinic acid Deficiency* and if the name *Pellagrous Encephalopathy* is adopted for the spastic deficiency syndrome seen in P.O.W. camps in the Far East there must inevitably be confusion with the encephalopathy named by Joliffe until *Pellagra* is precisely defined.

In considering the aetiology of the spastic syndrome its similarity to some at least of the numerous neurological syndromes included under the name of Lathyrism e.g. that described by MINCHIN (this Bulletin 1940 v 37 677) is worthy of consideration.]

Dean A. Smith

RASKAY S. B. The Production of Experimental Pellagra by Adenine. *Science* 1947 Jan 31 126-7

A preliminary report

PHILLIPS H. A. Genito Urinary Disorders occurring in Singapore Prisoner-of-War Camp with special reference to Polyuria and Non Specific Inflammations. *Med J Australia* 1946 July 27 v 2 No 4 111 13

Low grade inflamma
chronic non specific
nodule generally in

the upper pole involvement of the testis also occurred in the grossly debilitated

patients; the conditions appeared to be due to a low-grade staphylococcal infection reaching the epididymis via lymphatics from the prostate or bladder, the organism originally gaining ingress to the blood stream from infective skin lesions. Non-specific prostatitis also occurred. Pyelitis, cystitis and posterior urethritis were relatively common, staphylococci and colon bacilli being found in urinary smears. Sulphapyridine generally cleared up these infections rapidly; rest in bed with free fluids was insufficient. Recurrences were common. The frequency with which epithelial cells were found in the urine suggested that the urinary epithelium was not normal, and the absence of Vitamin A may have been a factor in this. Renal colic without detectable calculus was common despite the prevailing polyuria. Circumcision was frequently necessary in cases of scabies, tinea, and dermatitis, to relieve paraphimosis or to cure the otherwise intractable local condition. The involuntary escape of a small quantity of urine after otherwise normal micturition occasionally occurred and was thought to be due to atonicity of the sphincter. *F. Murgatroyd.*

HIBBS, R. E. Gynecomastia associated with Vitamin Deficiency Disease. *Amer. J. Med. Sci.* 1947, Feb., v. 213, No. 2, 176-7.

The condition appeared in 10 per cent. of 5,000 underfed U.S. prisoners of war in the Philippines.

SPRUE.

SUÁREZ, R. M., WELCH, A. D., HEINLE, R. W., SUÁREZ, R. M., Jr. & NELSON, E. M. Effectiveness of Conjugated Forms of Folic Acid in the Treatment of Tropical Sprue. *J. Lab. & Clin. Med.* 1946, Dec., v. 31, No. 12, 1294-304. [11 refs.]

Folic acid occurs naturally as the full vitamin and also in the form of various complexes or conjugates. Two of these, both polyglutamates, have been isolated in pure form, one from yeast, the other from a filtrate obtained from an aerobic fermentation of a diphtheroid organism. The folic acid complex of yeast has been identified as pteroylhexaglutamylglutamic acid. Fermentation folic acid is known to be a triglutamate (pteroyldiglutamylglutamic acid).

Fermentation folic acid appears to be utilized effectively by *Lactobacillus casei*, but for *Streptococcus faecalis* the compound has only about one-fiftieth the activity of pteroylglutamic acid. In those animals known to require folic acid (monkey, chick, rat), each of the conjugates exerts an effect equivalent to its folic acid content.

The effectiveness of folic acid in the treatment of pernicious and other forms of macrocytic anaemia has led to the investigation of these complexes as examples of the types of compounds from which human beings most probably derive a considerable portion of their supply of folic acid.

It has been suggested that the folic acid deficiency characteristic of pernicious anaemia might be due, at least in part, to the inability of the body to utilize adequate amounts of folic acid.

The administration of fermentation folic acid, in a dose equivalent to 3.1 mgm. of pteroylglutamic acid daily, caused improvement, in a patient previously treated with liver extracts, in both clinical and haematological manifestations. By complicated urinary studies it was found that, prior to treatment, amounts of free vita

those in normal subjects or in pernicious anaemia patients but the administration of the concentrate of pteroylhexaglutamylglutamic acid of yeast in daily doses equivalent to 8.4 mgm of free folic acid caused an equally striking improvement in a patient with sprue who had received no previous treatment. The reticulocyte response was maximal. Whether the

purified liver extract in addition to the conjugated vitamin the daily urinary elimination of folic acid was increased. These findings suggest that augmentation of the urinary elimination of free folic acid has resulted from an effect of purified liver extract on the metabolism of this naturally occurring complex of folic acid.

P. Manson Bahr

DARBY W. J., KASER Margaret M. & JONES E. The Influence of Pteroylglutamic Acid (a Member of the Vitamin M Group) on the Absorption of Vitamin A and Carotene by Patients with Sprue. *J. Nutrition* 1947 Feb 10 v 33 No 2 243-50 1 fig. [26 refs.]

Serum carotene and vitamin A levels in 4 cases of sprue treated with pteroylglutamic acid (PGA) are reported. It was found that the low serum

1
with PGA

It is suggested that the M group of vitamins plays an important role in the normal physiology of the gastrointestinal tract.

HAEMATOLOGY

MATILLA V., COVALEDA J. & APARICIO GARRIDO J. El mielograma de los indigenas de la Guinea Espanola [Myelograms in the Natives of Spanish Guinea]. *Med. Colonial* Madrid 1947 Jan 1 v 9 No 1 3-10

DISCO IBE G. & WATKINSON G. Atypical Anemia with Spherocytes and Target Cells coexisting in the Blood. *Amer. J. Med. Sci.* 1947 Feb v 213 No 2 153-9 5 figs. [22 refs.]

CARTWRIGHT G. E. & WINTROBE M. M. Hematologic Survey of Repatriated American Military Personnel. *J. Lab. & Clin. Med.* 1946 Aug v 31 No 8 886-99 7 figs. [13 refs.]

A haematological survey was made of 75 repatriated American prisoners of war who had been in Japanese hands for an average of 40.1 months. Their diet had consisted mostly of rice in amounts varying from 300-700 gm per man per day. Sometimes when soya beans were available, meat consisted of

Vegetables were served very infrequently and fresh fruit was not seen. Men resorted to eating snakes, rats, cats, dogs, lizards, frogs and any insects that

could be obtained. Red Cross packages were rarely distributed. The nutritional deficiency was shown by the history of cheilosis, glossitis, stomatitis, dermatitis, and diarrhoea in 50 to 70 per cent. of the men. A history of wet beriberi was obtained in 77 per cent. and of dry beriberi in 50 per cent. of them. A mild (haemoglobin 11-14 gm. per 100 cc. blood) or moderate (haemoglobin 8-11 gm. per 100 cc. blood) anaemia was observed in 52 per cent. of the men but it rapidly improved under adequate treatment. A history of malaria was obtained in 76 per cent. of the patients and intestinal parasites were demonstrated in about 75 per cent. In the 75 persons studied in detail, the anaemia was macrocytic in 73 per cent., normocytic in 23 per cent. and microcytic in 4 per cent. A mild reticulocytosis and leucocytosis were frequently encountered; eosinophilia was common. Blood films showed numerous macrocytes and anisocytosis, polychromatophilia, and an occasional nucleated red cell; about half the patients had low serum iron and copper values. It was thought that most of the men examined were in the recovery phase of severe nutritional macrocytic anaemia.

F. Murgatroyd.

SPIES, T. D. The Activity of another *L. casei* Factor in Macrocytic Anemia. *Southern Med. J.* 1946, Aug., v. 39, No. 8, 634-5.

Another *Lactobacillus casei* factor, obtained from a fermentation residue and almost as active as liver *L. casei* factor when assayed with *L. casei* but only 6 per cent. as active when assayed with *Streptococcus faecalis* R. was tested on a patient with macrocytic anaemia in relapse. He was given 3 mgm. daily by intramuscular injection for 11 days. The reticulocytes rose from 1 per cent. to 2.6 per cent. on the fifth day, reached a peak of 5.4 per cent. on the tenth day and subsided slowly to 2.6 per cent. by the sixteenth day. By this time the erythrocytes had risen from 1.89 to 2.4 million and the haemoglobin had increased from 10.2 to 10.5 gm. Bone marrow studies confirmed the response and subjectively the patient felt improved, his tongue stopped burning and his appetite was better. The blood response was submaximal but only small quantities of the factor were available for trial.

F. Murgatroyd.

PATEL, J. C. Crude and Refined Liver Extract in Nutritional Macrocytic Anaemia. *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 452-4. [13 refs.]

GENDEL, B. R. Folic Acid in the Treatment of Aplastic Anemia. *J. Lab. & Clin. Med.* 1947, Feb., v. 32, No. 2, 139-46, 3 figs. [13 refs.]

Three patients treated showed remissions of varying degree. The specific action of the folic acid is not conclusively proved in these cases.

HENDERSON, A. B. & THORNELL, H. E. Observations on the Effect of Lowered Oxygen Tension on Sicklemia and Sickle Cell Anemia among Military Flying Personnel. *J. Lab. & Clin. Med.* 1946, July, v. 31, No. 7, 769-76, 1 fig. [13 refs.]

As diminished oxygen tension induces sickling in those with sicklaemia, and as the incidence of sicklaemia averages between 7 and 9 per cent. in negroes in the United States of America, experiments were made to assess the suitability of negro aviators for high altitude flying. Among 260 negro candidates in various stages of training and 52 combat returnees, examined by the wet preparation method, 23 showed sickling, the incidence of the trait being therefore 7.37 per cent. None of the 23 affected men presented any other signs of disease, and they were then tested in a decompression chamber under lowered oxygen tension near the level of human intolerance, but none s

bilateral and only visible with the spots were few, whilst in some cases the spots coalesced to form larger patches up to 3 mm in diameter, or in other cases were arranged in fine horizontal striae or in multiple branched patterns. Occasionally deep striae were visible. These changes occurred most commonly in the intermarginal area. The corneal nerves were unduly prominent, but vascularization of the cornea was never observed. The symptoms were slight blurring of vision, slight grittiness of the lids and lacrimal symptoms and the condition was only prevented by the administration of B_2 deficiency. It was found possible to prevent the occurrence of the disease.

The disease is essentially due to a degeneration of the corneal epithelium rarely extending deeper into Bowman's membrane and is apparently not inflammatory as conjunctival and ciliary injections are infrequent.

Actual ulceration of the cornea although rare did occur in some cases, but after the introduction of red palm oil into the dietary the incidence of this complication dropped to nil.

The optic nerve lesion Claffy considers to be a chronic form of bilateral retrobulbar neuritis with vitamin B_2 complex deficiency.

to involvement of the affected. He considers the aetiology of the disease is related to an endogenous toxæmia produced by the ingestion of an ill balanced excessive carbohydrate diet lacking sufficient vitamin B_2 complex through faulty metabolism. This elaborates an endogenous toxin which affects either the ganglion cells of the macular bundle or both and possibly the trigeminal supplying the cornea. The sub-chiasmal part of the visual pathway is usually bilateral. Once treatment may prevent the secondary impairment of vision varies from 10 to 20 counting fingers at less than one metre and depends upon the concentration of the toxin.

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Claffy stresses that the first change in the optic nerve is failure of conduction of nervous impulses without destruction of nerve fibres and that recovery of vision is possible.

The importance of

The disease affected all ranks irrespective of age or occupation, it affected equally those working in or out of the sun. Excessive rice consumption appeared to be the most important predisposing cause, when associated with

insufficient vitamin B₂ complex to metabolize it. It is definitely not a disease associated with starvation and it was conclusively proved that in those who suffered semi-starvation the incidence of ocular deficiency disease was very low and in others when the rice ration was halved the incidence dropped practically to nil.

Intercurrent disease played an important part. The incidence following dysentery was high, the cases were of sudden onset, usually of severe degree, more resistant to treatment, and a relatively large number progressed to partial optic atrophy. Dengue fever and diphtheria were of much less significance, and recurrent malaria had apparently no ill-effect. Tobacco played no part in the causation of the disease and smokers responded to treatment even when they continued to smoke. Excessive muscular effort was a contributory factor, especially in those unaccustomed to it. A person could remain in a state of subclinical deficiency over a long period at a low basal metabolic level, but this delicate balance was easily upset by extra manual work or intercurrent disease.

Loss of weight, "eye strain", and focal sepsis played no part in the aetiology of deficiency disease, but on the other hand many did so. The most important of these were:—*Painful feet*. At the height of the epidemic period 75 per cent. of cases were affected, but this fell later to 2 per cent. *Corneal degeneration* The percentage varied from 66 to 15 per cent. *Stomatitis and Glossitis*. The percentage varied from 30 to 80 per cent. *Scrotal dermatitis*. Up to 80 per cent. were affected. About 1 per cent. were associated with nerve deafness, and 8 cases of spastic paralysis, only one showed evidence of retrobulbar neuritis. During an epidemic of pellagra none of the patients showed evidence of retrobulbar neuritis or of degeneration of the cornea, the only ocular finding being a mild conjunctivitis. Very few cases of beriberi were associated with retrobulbar neuritis even during the epidemic period and this was most probably due to the general prophylactic issue of rice polishings given at the time, but these had no effect in controlling the incidence of the ocular disease.

[From Claffy's findings it would appear that Manson's observations were correct, as he stated that the condition brought about by a deficiency disease merely predisposes to, or facilitates the operation of, something else, perhaps an unknown germ, which, but for this deficiency, would remain inoperative, even if introduced.]

The important symptom in uncomplicated cases was blurring of vision, one eye often being affected first; the onset might be sudden or gradual. Difficulty in reading was caused through the print becoming hazy and letters tending partially to disappear. Other symptoms were headache, aching and pains behind the eyes, and irritability in the sun.

Impairment of vision was of all degrees from 6/5 in mild cases to counting fingers at less than a metre in severe cases. In most cases, the fundi appeared normal. In 1 per cent. of cases, a mild papillitis was present. Retinal haemorrhages were present in 1.5 per cent. and were situated in the superficial layers of the retina near the disc margin; they varied considerably in size. Temporal pallor of the discs occurred, but was an unreliable sign and gave no indication of the degree of visual loss except in a few of the worst degrees of visual failure, when there was marked pallor of the whole disc together with narrowing of the retinal blood vessels. Scotomata were almost always demonstrable. They were usually absolute, central or paracentral in position, although centro-caecal or annular examples also occurred. The size varied from minute "flicker" to 1/1,000 red and green up to large central scotomata to 20/1,000 white. There was no disproportion between white and colours. Peripheral fields of vision usually remained intact. With treatment it was possible to stop the progress of the disease. The prognosis was excellent in early cases,

and 1 710, or 53·8 per cent were found to be infected. All these Africans were members of the various Bantu tribes living in the Southern Highlands Province.

were in any real danger of developing incapacitating complications. The incidence rate varies considerably from 13·7 per cent in the Rungwe district

trachoma in the Province

There to the tration through the cornea into the interior of the eye. To overcome the obstacles to the passage of the drug into the interior of the eye it has been given in the form of subconjunctival and intravitreal injections and iontophoresis of solution instilled into the conjunctival sac has been used but with indifferent results.

In contrast pure penicillin is remarkably well tolerated by the eye and dosage need no longer be limited by the intolerance of the eye to the impure supplies available till recently. Local applications containing up to 100 000 units per ml or per gramme in watery solutions and in ointments can be used. Repeated subconjunctival injections of 50 000 units in 0·5 ml of water are well tolerated and intravitreal injection though not free from secondary effects is also well tolerated. It is now clear that local applications in high concentration instilled into the conjunctival sac allow adequate penetration into the anterior chamber of the eye and experimental infections of the anterior

controlled by the local applications of drops, ointments and systemic administration and the only satisfactory method of treatment appears to be by subconjunctival injections.

The clinical use of penicillin in intraocular infections still requires clarification. The range of efficacy of ointments for intraocular infections has still to be established as has the frequency of application. Likewise clinical trial will have to establish the best way of giving massive doses of penicillin systemically. In intraocular infections involvement of the vitreous is always a serious complication even a low grade infection has a grave prognosis.

The authors' researches bring out forcibly three essential points: the need for early treatment; the continuation of treatment for at least 24 hours and possibly 72 hours after the eye is apparently normal; the fact that in anterior chamber infections evacuation and irrigation at an early stage in addition to subconjunctival injections may prove advisable.

* SORSBY A & UNGAR J. Pure Penicillin in Ophthalmology. *Brit Med J* 1946 Nov 16 723-31. 3 charts. [10 refs.]

BRITISH MED J 1946 Nov 16 740-41. [11 refs.] Penicillin in Intraocular Infections

It would appear that the adequate use of pure penicillin for intraocular infections promises control of a hitherto uncontrollable condition, but the optimum modes of use have still to be established. At present, subconjunctival injections of 50,000 units at 6-hourly intervals are recommended; and in the case of vitreous infections it may be necessary to combine subconjunctival with massive systemic injections and possibly even to employ direct injection of pure penicillin into the vitreous.

Ocular Complications of Relapsing Fever.—The ocular complications of African tick or relapsing fever are discussed by GARCIN.⁹ His observations are based on 7 cases which he treated at Dakar in the two years 1944–45. All these complications occurred in Africans and no ocular complications were seen in European patients. The probable explanation of this is that the uveal tract is more vulnerable in the case of the African, as his resistance has been lowered by other accompanying infections including syphilis, which is very common in French West Africa. In addition, Africans usually present themselves much later for treatment than Europeans. Ocular complications occur late in the disease (between the 4th and 10th weeks) and the commonest are iritis and affections of the vitreous; they are caused by infection through the blood stream and are independent of meningeal complications. Involvement of the vitreous is perhaps the most common; it may be present without any apparent inflammation of the iris and may only manifest itself by impairment of vision without any external evidence of inflammation. The vitreous becomes cloudy, obscuring all fundus details, but as a rule returns to normal with treatment, leaving no evidence of choroiditis.

Vision may be reduced very considerably, but provided the pupils are kept dilated with a mydriatic, the prognosis is good. Inflammation of the optic nerves is rare and dependent upon involvement of the meninges. Optic neuritis and optic atrophy do occur in relapsing fever, but they are probably due to the treatment of the disease with pentavalent arsenical preparations rather than to the spirochaete infection, much the same as occurs in the case of trypanosomiasis.

The author discusses the treatment with pentavalent arsenic and advises extreme caution with preparations of this drug if the eyes are involved, as the fundi cannot be watched. He advises repeated examination of the ocular fundi during the routine treatment of the disease with such preparations.

Occupational Ophthalmology.—Industrial ophthalmology is discussed by KUHN,¹⁰ who points out that the term is already obsolete and the more correct

his work are
hereby eyes
both actual

Here the

future use of special occupational glasses gives promise of being a contribution to visual comfort, increased production and many industrial relations problems. The collection of properly recorded visual statistics by the use of modern punch-card analytical procedures is discussed. The development of closer

colour in reducing visual fatigue and of what constitutes a minimum industrial eye service for either a large or a small plant should be acquired.

⁹ GARCIN, G. Au sujet de quelques cas de complications oculaires de la fièvre récurrente à tiques dakaroise. *Bull. Méd. de l'Afrique Occidentale Française*, 1946, v. 3, No. 1, 57–64. [14 refs.]

¹⁰ KUHN, H. S. Industrial Ophthalmology as of 1946. *J. Amer. Med. Ass.* 1946, Nov. 30, v. 132, No. 13, 772–7, 4 figs.

ADOLPH, E. F. Tolerance of Man toward Hot Atmospheres. *Pub. Health Rep.* Wash. Suppl. No. 192. 38 pp., 28 figs. [73 refs.] [Summary appears also in *Bulletin of Hygiene*].

This report was originally prepared to delimit the climates disadvantageous in military operations. It is based on research work carried out during the recent war and on other information derived from industrial studies.

Forty years ago, HALDANE concluded that even lightly clothed persons could not withstand wet-bulb temperatures exceeding 88°F ., and that continuous hard work was impracticable at wet-bulb temperatures above 78°F .. More recent work indicates that higher temperatures than those recorded by HALDANE as the limiting values can be withstood. It appears that nude men while sitting can withstand a wet-bulb temperature of 94.5°F . indefinitely, while when walking the limit is 92°F . wet-bulb. For a relatively short exposure the limiting temperatures are higher.

Although these findings are quoted in terms of wet-bulb temperature some researches have shown that the limiting wet-bulb temperatures vary with change in relative humidity. With low humidities—and high dry-bulb temperatures—the limiting wet-bulb temperature is somewhat reduced. From some American studies it appears that with relative humidities varying between 15 per cent. and 100 per cent. the limiting conditions are adequately expressed in terms of the scale of effective temperature, so long as radiation is not a factor of importance. From other recent researches, however, it appears that in spite of wide changes in relative humidity the wet-bulb temperature is a better index than effective temperature. Further work appears to be necessary to clarify tion is drawn the air is above ft. per minute has little additional effect, for, it is remarked, its cooling or heating effect varies roughly as the square root of the air velocity.

Clothing has a substantial effect. The limiting wet-bulb temperature is reduced by about 3°F . with even the lightest complete clothing. Arctic winter clothing plus an impermeable outer suit cannot be worn for four hours at rest at a wet-bulb temperature greater than 81°F ., and at that temperature a man wearing a chemical-warfare suit cannot work at decontamination for more than one hour.

Over short periods of time clothing may afford to men at rest appreciable protection from heat. In the heat, one is less concerned with the insulating

are reflective.

Work shortens the time during which one can stay in a given hot atmosphere. Thus, when working at the rate of 208 kgm. per minute, one can endure a wet-bulb temperature of 100°F . only one-third as long as when at rest. Temperatures of about 90°F . become intolerable at this rate of working, while they can be tolerated indefinitely while resting.

Body size may be crucial in determining ability to work in hot environments. Those with a high ratio of surface to weight fare better in the heat.

People gain much acclimatization to heat with the first few exposures. In the course of a week's acclimatization, an increased wet-bulb tolerance of as much as 10°F . may be gained. It is suggested that acclimatization to moist heat demands more modification in circulatory functions, while acclimatization to dry heat includes the ability to produce more sweat upon the same provocation.

Acclimatization to dry heat is a partial but not a complete acclimatization to moist heat

function Young men of 21 to 26 years of age are the most tolerant of heat

In hot surroundings the water content of the body must be maintained. Shortage of water to the extent of only 2 or 3 litres renders the body heat intolerant. Water depletion leads to dehydration exhaustion which can be quickly relieved by drinking water. Data are cited to show that the wet bulb temperature needs to be lowered by 13°F to compensate for a loss of body water equal to five per cent of the body weight.

Low salt intake in those exposed to heat may cause the development of muscle cramp. It has been suggested that men adapt themselves to restricted salt intakes by forming sweat of low salt content but the tolerance to heat may not be as good as with a high salt intake.

Many functional conditions impair the tolerance to heat. Amongst these are the aspects of heat author mentions the machine and furnace radiation the effects of contact with hot surfaces and the long term effects of heat
Thomas Bedford

TROPICAL ULCER

CHARTERS A D The Aetiology of Tropical Ulcers in Somalis *J Trop Med & Hyg* 1947 Feb v 50 No 2 22 7

The author has previously suggested that food deficiency especially of calcium and vitamin A is an important factor in the aetiology of tropical ulcer [see this *Bulletin* 1944 v 41 235]. He based that opinion on observations made on Somali and other African troops during the war and in the present paper he records further observations on Somali troops in relation to their diet.

The staple food of Somalis in civil life is camel milk and when this is unobtainable the milk of goats, sheep or cattle is used. Some meat is eaten and rice is coveted but not plentifully used. The quantity of camel milk available depends on season and grazing. In the army the Somali soldiers were provided with a liberal diet but not with camel milk. They usually refused palm oil and beans and could only with difficulty be persuaded to take fresh vegetables unless they were cooked in with meat but they bought milk when they could.

The incidence of tropical ulcer until fresh milk was available and reduction in incidence when supply of camel milk declined because of drought and poor grazing. A very close correspondence was found between the incidence of ulcer and lack of milk in various bodies of Somali troops about this time and the author notes that officers of the Somali Scouts have independently formed the opinion that camel milk gives protection against tropical ulcer. He thinks that there is evidence of some protective substance in milk and possibly in fresh vegetables. He does not suggest what that substance is. He points out that the army rations provide very much more food than Somali civilians are accustomed to. In the

outbreaks to which he refers, minor foot injuries were no more common during the time of high incidence of ulcer than at any other time.

Charles Wilcocks.

HARE, K. P. The Comparative Value of some Methods of Treatment in Cases of Tropical Ulcer. *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 449-51.

GRENOUILLEAU, G. An Epidemic of Phagadenic Ulcers in Algeria. *Bull. Office Internat. d'Hyg. Publique.* 1946, July-Aug.-Sept., v. 37, Nos. 7-8-9, 634-44. [French version 622-33, 1 chart.]

MISCELLANEOUS DISEASES.

HODGES, H. H. & FREEMAN, N. E. Thrombophlebitis on the Medical Service of a General Hospital. *Amer. J. Med. Sci.* 1947, Feb., v. 213, No. 2, 226-32. [26 refs.]

The authors report, from the Burma front, 9 American soldiers who developed thrombophlebitis; 7 of the patients had scrub typhus, 1 acute arthritis, and 1 was suffering from depressive psychosis. The veins of the calf, the femoral veins and the ilio-femoral veins were affected, and the phlebitis was sometimes accompanied by fever, sometimes not; in 1 patient there had been two pulmonary emboli before the phlebitis was diagnosed. Early symptoms were discomfort and stiffness, pain along the course of the vessel, and, sometimes, signs of obstruction, but diagnosis may be difficult as signs may be slight and obstruction incomplete. The principal factors in causation seem to be decreased rate of blood flow, perhaps due to the position of the patient in bed; endothelial injury (which may be present in scrub typhus); increased coagulability of the blood; increased vasomotor tone; and an unknown factor, presumably toxic, liberated into the circulation as a result of disease or injury.

Treatment was by lumbar paravertebral sympathetic block for phlebitis of the calf veins, which gave good results, presumably by tending to prevent central propagation of the thrombus; by proximal ligation if the femoral veins were involved; by the use of heparin when the ilio-femoral veins (which could not be tied) were affected.

[There is no indication that these cases were similar to those reported by MANSON-BAHR & CHARTERS, this *Bulletin*, 1946, v. 43, 1186.]

Charles Wilcocks.

JOSEPH, A. D. Tropical Eosinophilia. *Indian Med. Gaz.* 1946, Dec., v. 81, No. 12, 515-20. [20 refs.]

Tropical eosinophilia has been reported quite often from India, and the author adds to the literature by giving a careful account of 16 patients diagnosed at his tuberculosis clinic in the coastal area of Kathiawar. There were 10 males; the patients were aged 8 to 55; caste, season and occupation had little bearing but 4 of the patients gave a history of allergy in their families. The symptoms included severe cough, expiratory dyspnoea like that of asthma (for which the patients sought relief), some fever, loss of weight (cough and dyspnoea excited

signs included those of pulmonary consolidation, splenomegaly in some,

Acclimatization to dry heat is a partial but not a complete acclimatization to heat.

There are considerable differences in the susceptibility to change. There seems to be a marked difference in function. Young men of 21 to 26 years of age are the most tolerant of heat.

In hot surroundings the water content of the body must be maintained. Shortage of water to the extent of only 2 or 3 litres renders the body heat-intolerant. Water depletion leads to dehydration exhaustion which can be quickly relieved by drinking water. Data are cited to show that the wet bulb temperature needs to be lowered by 13°F to compensate for a loss of body water equal to five per cent of the body weight.

Dehydration in those exposed to heat may cause the development of heat stroke.

Many functional conditions impair the tolerance of heat. These include fevers, wounds (with haemorrhage) and fatigue. Among the aspects of heat tolerance on which further investigation is required the author mentions the effects of solar radiation upon tolerance, the effects of machine and furnace radiation, the effects of contact with hot surfaces and the long term effects of heat.

Thomas Bedford

TROPICAL ULCER

CHARTERS A. D. The Aetiology of Tropical Ulcers in Somalis. *J Trop Med & Hyg* 1947 Feb, 50 No 2 22-7

The author has previously suggested that food deficiency, especially of calcium and vitamin A is an important factor in the aetiology of tropical ulcer [see this *Bulletin* 1944]. In the present paper he records further observations made on Somali and other subjects.

The staple food of Somalis in civil life is camel milk and when this is unobtainable the milk of goats, sheep or cattle is used. Some meat is eaten and rice is coveted but not plentifully used. The quantity of camel milk available to the army the Somali soldiers were provided with was very small. They usually refused palm oil and were persuaded to take fresh vegetables. They bought milk when they could.

He points out that the army ration does not suggest what that substance is. He points out that the army ration provide very much more food than Somali civilians are accustomed to. In the

outbreaks to which he refers, minor foot injuries were no more common during the time of high incidence of ulcer than at any other time.

Charles Wilcocks.

HARE, K. P. The Comparative Value of some Methods of Treatment in Cases of Tropical Ulcer. *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 449-51.

GRENOUILLEAU, G. An Epidemic of Phagadenic Ulcers in Algeria. *Bull. Office Internat. d'Hyg. Publique.* 1946, July-Aug.-Sept., v. 37, Nos. 7-8-9, 634-44. [French version 622-33, 1 chart.]

MISCELLANEOUS DISEASES.

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signs included those of pulmonary consolidation, splenomegaly in some,

enlargement of glands in the neck axilla groin or abdomen and pleurisy. The leucocyte count was from 13 500 to 48 000 with eosinophils from 19 to 74 per cent. These cells were also found in the sputum. The erythrocyte sedimentation rate was raised the histamine test was positive in 2 cases only.

Radiological examination of the chest shows diffuse mottling usually symmetrical and most dense round the hila this is coarser than that of miliary tuberculosis. Diagnosis is not easy and an X ray film is needed. Treatment with N A B or other organic arsenicals is very satisfactory.

The author discusses the possible aetiological factors in this disease mentioning especially the virus theory but he is not in a position to make any decisive judgment on the matter.

Charles Wilcocks

PERLINGIERO Josephine G & GYÖRGI P. Chronic Eosinophilia. Report of a Case with Necrosis of the Liver, Pulmonary Infiltrations, Anemia and Ascaris Infestation. *Amer J Dis Children* 1947 Jan v 73 No 1 34-43 4 figs. [Ref. in footnotes.]

BEATO GONZALEZ I. Las parálisis por picadura de garrapata en el hombre [Tick Paralysis in Man]. *Med Colonial Madrid* 1947 Mar 1 v 9 No 3 235-58 52 refs.]

A historical review

PATON J P J, PECK C R & VAN DE SCHAAF A. Report on a Case of Melioidosis from Siam. *Brit Med J* 1947 Mar 15 336-7

The authors describe a fatal case of melioidosis in a Dutch ex prisoner of war in Siam. As is usual in these cases diagnosis was not made during life the clinical features suggesting pneumonia during the early stages and subacute bacterial endocarditis later in the disease. The most prominent symptoms and

thiazole. The post mortem findings included pericarditis multiple abscesses of the small bowel and the kidneys and congestion and enlargement of the spleen. *Pfeifferella whitmorei* was isolated from the abscesses the spleen and the heart blood.

In a footnote the observation of one other case in Siam and five cases in Rangoon is recorded.

J C Cruickshank

PECK C R & ZWANENBURG T. A Case of Melioidosis presenting as an Abscess in the Neck. *Brit Med J* 1947 Mar 15 337-8

Pfeifferella whitmorei was isolated from the tenacious yellowish brown pus

occurred after an autogenous vaccine had been used for some weeks. The infecting organism was not sensitive to penicillin in vitro.

J C Cruickshank

ZOTTA, G., RADACOVICI, E., CANTACUZÈNE, A., LUPASCO, G. & TEODORESCO, A. M. Contribution à l'étude du parasitisme intestinal chez l'homme en Roumanie. [Intestinal Parasitism in Man in Rumania.] *Arch. Roumaines Path. Expér. et Microbiol.* 1942, July-Dec., v. 12, Nos. 3/4, 479-83.

Examinations of stools from 5,661 persons at l'Institut Cantacuzène during the nine years 1933-1941 showed 2,319 persons to harbour parasites. The actual numbers harbouring the various parasites are set forth in tables; from these it will be seen that 1,551 had helminth infections, and 1,271 protozoal infections; some had multiple infestations. Of the helminth infections, *Trichuris trichiura* was found in 745 persons, *Ascaris lumbricoides* in 365, *Diphyllobothrium latum* in 147, and *Taenia saginata* in 140; other helminth infestations were recognized in lesser numbers of cases. *Entamoeba coli* accounted for the protozoal parasitization of 903 persons and *Giardia intestinalis* of 308; other protozoa were recognized in substantially smaller numbers of cases. [It is very remarkable that neither *Endolimax nana* nor *Entamoeba histolytica* was encountered in a single case.]
A. R. D. Adams.

SINGH, H. Some Useful Wild Plants of the Delhi Province. *Indian J. Agric. Sci.* 1945, Dec., v. 15, Pt. 6, 297-308, 17 figs. on 3 pls. & 2 text figs.

Includes many species claimed to have medicinal properties.

GENERAL PROTOZOOLOGY.

SYVERTON, J. T. & SLAVIN, H. B. Human Toxoplasmosis. *J. Amer. Med. Ass.* 1946, July 20, v. 131, No. 12, 957-9, 2 figs.

The case reported is that of a man 65 years of age who in 1942 was admitted to hospital in Rochester, U.S.A., with a three weeks' history of fever, diarrhoea, crampy discomfort in the abdomen and aching pain in the right elbow. In spite of numerous examinations and tests, the only definite abnormality discoverable was an eosinophilia ranging from 26 to 45 per cent. of the white cells. In view of this, trichinosis was suspected and a biopsy of a portion of this material, two toxoplasma were seen. . . . to hospital and . . . he was sectioned . . . to an emulsion and used for inoculating 6 mice, 4 guineapigs and 2 rabbits. The kidneys and spleens of these animals were used for passages in which 24 guineapigs, 11 rabbits and 67 mice were used. Parasites were found in only three animals—a guineapig and rabbit of the first passage and a guineapig of the third passage. A serological test carried out by SABIN seven weeks after the onset of illness failed to demonstrate antibodies in the patient's blood. The patient, who had left hospital 20 days after admission, then complained only of weakness. He was seen from time to time during the next 3 years, his blood picture gradually returning to normal.

Of the 35 cases of toxoplasmosis which have been reported to date only three have been in adults. Recovery has occurred in a single instance only—that of a boy who had acute toxoplasmic encephalitis. The present case is of interest in that recovery occurred and in that it is one of the few cases in which a diagnosis by microscopic demonstration of the parasite and animal inoculation has been carried out.

C. M. Wenyon.

ROBERTSON E G Toxoplasmic Encephalomyelitis, with the Report of Two Cases *Med J Australia* 1946 Sept 28 v 2 No 13 449-52 1 fig [13 refs]

The two cases described one in a girl 13 years of age from Tasmania and the other in an infant of 13 months from Melbourne correspond clinically with cases of toxoplasma infection as described in recent years by SABIN and others in the U.S.A. There seems to be little doubt that infection had occurred in utero and that the patients had survived the infection. In the first case the right eye was smaller than the left and showed defects of vision and other abnormalities. There were headaches and periodic epileptiform seizures and dullness of intellect. In the infant the left eye was smaller than the right and was defective in other respects. In both cases X-ray examination revealed

existence of the disease in Australia

C M Henyon

ADLER S SADOVSKY A & BICHOVSKY L Acquired Resistance to Stilbamidine and Pentamidine in *Trichomonas vaginalis* *Harefuah* Jerusalem 1947 Tel 16 v 32 No 4 [In Hebrew 54 v English summary 55]

CIRP² V J Observations on *Leptorhynchus stenoccephali* (Fantham, 1912) *Trans Roy Soc Trop Med & Hyg* 1947 Mar v 40 No 4 495-500 8 figs

GENERAL ENTOMOLOGY

HERR R W & RAFFERTY W J A Constant-Pressure Air Valve for the Peet-Grady Atomizer Reprinted from *J Council Scient & Indust Res* 1946 Aug v 19 No 3 241-4 2 figs

An attachment for the standard Peet Grady atomizer (De Vilbiss Special No 5004) which ensures delivery of air at a constant pressure of 12.0 (± 0.5) lb per sq in through a spring loaded transfer valve to the standard atomizer and is such that when the transfer valve is in the rest position the compressed air which operates the atomizer escapes through a needle valve matched with the atomizer. Depression of the trigger diverts the air stream to the atomizer without alteration in air pressure. This device in no way affects the atomizing characteristics of the atomizer.

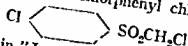
BOARD OF TRADE German Industry CLOS VARIOUS Insecticides, Insect Repellents, Rodenticides and Fungicides, I G Farbenindustrie A G Elberfeld and Leverkusen 46 mimeographed pp 1946 London H M Stationery Office [4s]

— CLOS VIII 20 Manufacture of Insecticides, Insect Repellents, Rodenticides, I G Farbenindustrie A G, Leverkusen and Elberfeld 12 mimeographed pp 1946 London H M Stationery Office [1s]

— FIAT 38 Investigation of Insecticide and Insectifuge Research and Manufacture in Western Germany 30 mimeographed pp [1947] London H M Stationery Office [3s]

German research on insecticides during the war had progressed to a considerable degree in several directions. It seems that the Germans knew of DDT and

were experimenting to try to simplify its manufacture and use. The result was a product called "Lauseto" which contained DDT in a rather crude state but which was easily prepared and emulsified. Attempts were also made to find substances akin to DDT but not covered by the Geigy patent. The most promising substances were "Gix" or "Fluorgesarol" (with fluorine replacing chlorine in the *para* positions on the molecules of DDT), and "Me1700" or dichlor diphenyl dichlorethane (DDD). [Both are of the order of one-third to one-sixth the toxicity of DDT, and have no particular advantage over it.] A new class of compounds was found to have considerable promise from the insecticidal point of view; this was the sulphones. Some of them are too toxic to mammals to be suitable insecticides but others appear to be quite safe. The most widely used was chlorphenyl chlormethyl sulphone which



was the main toxic agent in "Lauseto Neu". Both this and the "Lauseto" were used to impregnate clothing against body lice. This compound is of the order of toxicity of DDT to some insects but it is handicapped by a very low degree of solubility in mineral oils as well as in water.

In the absence of nicotine, the Germans used a substance they called "Bladan" for agricultural uses; the active principle being the hexa-ethyl ester of tetraphosphoric acid $((\text{C}_2\text{H}_5\text{O})_2\text{PO})_3\text{PO}$. This compound is unstable on storage and does not compete with nicotine where the natural product is available.

In the field of insect repellents the Germans discovered a very promising compound described as "50/181". This is trichloroacetyl chlorthethylamide, $\text{CCl}_3\text{CO.NH.C}_2\text{H}_4\text{Cl}$, a solid substance which was compounded into the following formula for use —

7.5 per cent	" 50/181 "
1.25	" CaCl_2
1.25	" MgCl_2
60	" Absolute alcohol.
30	" Water

Its possible toxicity to man is not known with any certainty.

J. R. Bursvine.

JOHNSON, C. G. Field Tests on some Pyrethrum Anti-Mosquito Repellent Creams against Woodland Species of *Aedes* in Britain. *J. Trop. Med. & Hyg.* 1947, Feb., v. 50, No. 2, 32-6.

Using a standard technique, the author has compared the properties of three types of repellents against British *Aedes* species, chiefly *A. punctor*, *A. cantans* and *A. annulipes*. The results are expressed in terms of a standardized bitin rate, or SBR, in which 0 indicates complete protection as compared with control: 100 no protection, and 60 a 40 per cent. reduction in bites.

The one-time standard Army citronella cream, containing 28 per cent. oil of citronella in hard and soft paraffins, gave no protection after more than two hours and was in any case so disliked as to be useless. A paraffin cream containing 1 per cent. pyrethrins gave poor protection, the SBR varying between 64 and 108 per cent. A similar strength of pyrethrins in gum tragacanth emulsion gave good protection for at least $7\frac{1}{2}$ hours, the SBR varying from 16 to 29 except for one reading of 52 at $4\frac{1}{2}$ to 5 hours. A repetition of the experiment with similar preparations or slight variations of them convinced the author that this decreased repellency at about 4 hours, followed by recovery, was a real phenomenon, perhaps associated with the action of water on pyrethrins.

G. Macdonald.

VAN SOVEREN F C C The Description of a New Anopheles of the Myzorrhynchus Series from Madagascar with Notes on its Systematic Position in relation to the Ethiopian Species of this Group *East African Med J* 1947, Jan v 24 No 1 42-6 2 figs

McMAHON J P Simuliidae of Keoya *East African Med J* 1947, Jan v 24 No 1 51-6

A general account of the subject

IRIARTE D R La familia Simuliidae en Venezuela [The Simuliidae of Venezuela] *Bolet Laboratorio Clinica Luis Razetti* 1946 June v 14 Nos. 19/20 333-47 & Dec v 15 Nos 21/22, 401-82 17 figs 5 pls. & 2 maps [Bibliography] English summary

SODGRASS R E The Skeletal Anatomy of Fleas (Siphonaptera) *Smithsonian Miscellaneous Collections* 1946 Apr 1 v 104 No 18 (Publication 3815) 89 pp 8 figs & 21 pls. [39 refs]

MANUWA S L A Poroccephalosis [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1947 Mar v 40 No 4 507-8

The author refers to STOCK's note [this *Bulletin* 1947 v 44 136] regarding *Armillifer* infestation of the lung and records that he has seen 5 cases in 19 years in Southern Nigeria. Two were seen in an inguinal hernial sac at operation and two were only diagnosed at autopsy. The fifth took the form of a calcified nodule on the pelvic wall and to the root of the mesentery the lower ileum. The patient relieved by division of the band of 4 *armillatus*.

All five cases were found in members of tribes given to eating snakes or of using them for juju.

The author analyses the evidence and his own observations which he summarizes thus —

1 Infestation is usually symptomless unless heavy parasitization of a vital organ occurs. (CANNON's case [this *Bulletin* 1943 v 40 415] is quoted in which a heavy infestation of the colon produced a fatal obstruction.)

2 If the nymphs rupture their cysts escape and migrate serious pathological lesions may occur in one of the author's cases nymphs were found in radicles of the hepatic vein and the symptoms suggested acute poisoning.

3 Calcareous and degenerative reactions around the nymphs may produce mechanical disturbances but there is no evidence that the parasites produce toxins.

H J O D Burke-Gaffney

LABORATORY PROCEDURES

CHATTERJEE H N A New Method of demonstrating Malarial Parasites in the Peripheral Blood. *Trans Roy Soc Trop Med & Hyg* 1947, Mar, v 40 No 4 501-3 [11 refs]

The author describes a supravital technique in which fat free slides are prepared with a film of 2 parts of Leishman stain and 1 part of brilliant cresyl blue (1 per cent alcoholic solution). The stain is dried quickly, without direct heat and the blood is taken from a finger on a fresh fat free alcohol-cleaned

coverslip, which is placed immediately on the stained slide. The preparation is examined after 10 minutes standing at room temperature, but not later than 24 hours after it has been made.

The chromatin of the parasite stains chocolate red, the cytoplasm deep blue and the corpuscle light green. This contrast makes it possible to pick out parasites very readily; there is little distortion of red cells and reticulocytes are also stained.

The author claims that this technique combines all the advantages, and none of the drawbacks of a thick smear; and that as fixing, dehaemoglobinization, drying, washing and other time-consuming processes are eliminated, it is as quick as most methods now in use. Prepared slides may be carried in boxes for field mass-examination, so that all that is required further is to touch a drop of blood on the coverslip, place it on the slide and examine after 10 minutes.

JOANNIDES, G. A Simple Method of Staining Malaria Parasites. *J. Lab. & Clin. Med.* 1947, Jan., v. 32, No. 1, 89.

This represents yet another simple stain for malaria parasites, developed during the wartime shortage of the common stains and reagents. It is a combination and modification of many other methods, and its efficacy is believed to be due to (1) the almost complete transformation of methylene blue to azure (2) the relatively greater alcohol-solubility of the latter (3) the insolubility of borax in alcohol.

Methylene blue (0.5 gm.) and borax (1.5 gm.) are placed in a 50 cc. porcelain dish, to which is added, with stirring, 30 cc. of boiling tap water and of evaporation are maintained at a temperature of 75° to 80°C.

The processes of adding 30 cc. of boiling tap water and of evaporation are repeated a second and a third time.

At the end of 24 hours standing, a dry blue compact mass is left in the dish. To this, without stirring, 30 cc. of 95 per cent. alcohol are added, after which the alcohol is decanted five minutes later into a 100 cc. bottle and the residue in the dish is allowed to dry almost completely. This extraction is repeated a second and third time, with 30 cc. and 40 cc. of alcohol respectively. The bottle now contains about 100 cc. of the alcoholic extract, without a precipitate.

For staining, 15 drops of the alcoholic stain are placed on an unfixed blood film. At the end of 30 to 60 seconds, 15 drops of a 1 to 2,000 solution of eosin in tap water are added. The stains are mixed with a glass rod. After 3 to 4 minutes, the slide is flooded with tap water, washed with it and dried. The following staining appearances are seen:

Red cells—light green, with a pinkish cast.
Eosinophiles—pink granules.
Other leucocytes—as in Giemsa's stain.
Malaria parasites—as in Giemsa's stain, but stained rather less deeply.

MANISCALCO, G. Per la colorazione del parassita malarico. [To Stain Malaria Parasites.] *Riv. di Malarologia.* 1942, Nov.-Dec., v. 21, No. 6, 436-7.

The following method is advocated for the staining of blood films for demonstration of malarial and other parasites. To a solution of 5 gm. of medicinal methylene blue in 250 cc. distilled water, are added 25 cc. of pure ammonia solution. The mixture is steamed on a water bath till evaporation has taken place. After cooling, the residue is pulverized in a mortar. Five solutions are

prepared —(1) Of the ab

The immediate staining solution is prepared by adding 1 cc of solution 3 with 35 cc tap water and adding 4 drops of each of the other solutions. This quantity of stain which retains its properties for 24 hours is sufficient for a Choplin dish holding a number of slides. Thin films are first fixed in methyl alcohol but thick films are stained directly. After half an hour's staining the slides are washed in tap water. The staining is said to resemble that given by the May Grunwald Giemsa method.

C M Henyon

SIMONS H C R. Kritische Beiträge zur parasitologischen Feindiagnostik von Blutparasiten unter Berücksichtigung der neuen Thedanblau Methoden. Postvital gefärbte Nativpräparate von Trypanosomen, Spirochäten und Plasmodien insbesondere Halbmonden. Native Leuchtbilder von Spirochäten. Fehlerquellen durch Pseudospirochäten. [New "Thedanblau" Stain for Blood Parasites and Blood Corpuscles.] *Schweiz med Woch* 1946 Sept 28 v 76 No 39 992-4 [Numerous refs.]

For some years the author in collaboration with Theda STUCKGOLD KORNELIUS who died in 1945 has studied the combined action of saponin and methylene blue on blood parasites and blood corpuscles. A stable mixture of these two substances has been devised and named Thedanblau in honour of the deceased collaborator. The mixture which is stable even under tropical conditions is haemolytic by virtue of the saponin and a staining reagent by virtue of the methylene blue. Its two fold action is almost instantaneous.

employed on ordinary dry films. It is particularly useful when parasites are very scanty in the blood, cerebrospinal fluid or lymph gland material. For the identification of trypanosomes and spirochaetes it is useful as these organisms assume a characteristic red colour and with the haemolysis of the red corpuscles are very conspicuous. For malarial parasites the crescents are most clearly shown though other pigmented stages including schizonts with their merozoites can be identified. The non pigmented stages are liable to confusion with reticulocytes. The use of Thedanblau is recommended for field work when intensive surveys are being made. The paper gives a mass of detail of the various methods of using the stain which is undoubtedly a useful addition to microbiological technique.

The exact composition of the stain is not given. manufacturer: Negociateur A G Munchenstern b Basel. C M Henyon

PARÁ M. Silver Impregnation of Spirochetes in Tissue Sections. Description of a New Technique. *Arch Pathology* 1946 Dec v 42 No 6 649-55 [Summary appears also in *Bulletin of Hygiene*]

The author describes at length and in great detail a method which he has devised for silver impregnation of spirochaetes in tissue sections.

The details do not lend themselves to abstraction and the original paper should be consulted in this connexion.

The fundamental principle of the method is the use of a lithium silver complex in a colloidal medium to obtain selective impregnation.

A "basic" and a "rapid" method are described: in the latter, a double process of impregnation and reduction avoids the use of a mordant, and the process may be completed in two hours.

The fundamental reagents required in the basic method are uranium nitrate, silver nitrate, lithium carbonate, rosin and Levaditi's reducing solution. Satisfactory substitutes for the reagents used in the mordant, the sensitize and the reducing agent are described: the author particularly emphasizes the possibility of using ox-bile as a substitute either for the rosin or the lithium-silver complex: not only does it serve this dual capacity, but it is easy to obtain.

A "combined" process and other variations in the technique indicate its wide range and applicability. The method should prove a useful and accurate one for the rapid demonstration of spirochaetes in paraffin sections.

H. J. O'D. Burke-Gaffney.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

SERGIJEV, P. G. [Report on the Activities of the Institute of Malaria, Medical Parasitology and Helminthology of the Academy of Medical Sciences during the last 25 Years.] *Med. Parasit. & Parasitic Dis.* Moscow, 1946, v. 15, No. 1, 3-18; No. 2, 3-20. [In Russian.]

In this article, the Director of the Institute, which is a branch of the Academy of Medical Sciences of U.S.S.R., gives an historical survey of its organization and activities during the 25 years since it was founded as the Tropical Institute.

The main objects of the Institute are (1) practical assistance to the Commissariat (now Ministry) of Health in the organization of measures for combating malaria and other parasitic diseases; (2) training of specialists for the staffs of malaria units; and (3) research work in medical parasitology.

The Institute has devised antimalarial measures applicable to conditions in different parts of the Soviet Union, which were studied locally by members of its staff from Moscow. The Institute was also responsible for the creation and organization of most of the tropical institutes in the federated republics. It also directed numerous expeditions throughout the Union, with the object of making epidemiological surveys of parasitic diseases and of testing the application of control methods elaborated at the Institute.

Instructions for medical practitioners and other literature dealing with prophylactic and therapeutic treatment of parasitic diseases in U.S.S.R. have been issued by the Institute.

The teaching work comprises postgraduate training of specialists in malaria and general medical parasitology and the provision of laboratory facilities for practical training in research work. Most of the workers in medical parasitology scattered throughout the country have received their training at the Moscow Institute.

The review deals largely with the results achieved by research workers attached to the institute. Most of the relevant papers have appeared in *Medical Parasitology and Parasitic Diseases* (formerly *Russian Journal of Tropical Medicine*), published by the Institute.

Much of the work carried out at the Institute has been devoted to various aspects of malaria: its parasitology, pathology and clinical course, drug treatment and prophylaxis, vectors and mosquito control, as well as epidemiology. Notable advances have been made in the study and control of helminthic diseases, diseases transmitted by sandflies (leishmaniasis and sandfly fever), protozoal infections, rickettsial and virus diseases, tick-borne diseases (relapsing

describing this work have already been reviewed in this *Bulletin* during the period covered by this report

C A Hoare

VAN LOGHEM J J Health Conditions in the Netherlands East Indies during the Japanese Occupation *Bull Office Internat d Hyg Publique* 1946 July-Aug-Sept v 37 Nos 7-8-9 513-19 [French version 506-12]

SIMMONS J S Tropical Medicine and the Challenge of Global War. *Amer J Trop Med* 1947 Jan v 27 No 1 1-9 2 charts

SIMMONS J S Tropical Medicine and the Challenge of Global Peace. *Amer J Trop Med* 1947 Jan v 27 No 1 11-19

BOOK REVIEW

COXA-GARCIA Pablo Notas sobre los Anofelinos de Venezuela y su Identificación [Notes on the Anophelines of Venezuela and their Identification] VII Conferencia Sanitaria Panamericana Cuadernos Amarillos No 1 208 pp, 42 figs & 53 pls [Bibliography] 1946 Caracas. Editorial Grafolit

This book is a manual, in Spanish for the identification of the species of *Anopheles* about 30 in all which occur in Venezuela. It deals in detail with

The author confines himself to *Anopheles* as a dead specimen. He gives brief general notes on biology, but nothing on biological differences between species, there is nothing on the relation of species to malaria, or on control

P A Buxton

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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1947.

[No. 7.]

SUMMARY OF RECENT ABSTRACTS*.

VI. PLAGUE.

Epidemiology: Transmission.

DEVIGNAT (p. 647) has devised a scheme of standardization for the epidemiological study of plague, which takes into account the disease in field rodents, domestic rodents and man, and the various means of transfer between them. The scheme has been worked out as a result of experience in the Lake Albert region of the Belgian Congo. He (p. 1137) elaborates his scheme in another paper

of spread in rodents and man. Pneumonic plague is expressly excluded from these calculations. For details the original papers must be consulted.

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... It is as
... lation to
plague in Argentina, the only useful anti-rodent measures are those which can be directed against rats.

BLANC and BALTAZARD (p. 1038) have shown that the faeces of fleas infected with plague, taken from the hair of a rat dead of plague, may remain infective for as long as 16 months, if kept in an ampoule, in the dark, at room temperature, and tested by subcutaneous injection. It seems probable that the ... and
... It
... emia
may themselves pass faeces containing living bacilli, which may persist as they do in flea faeces.

HAMPTON (p. 554) shows that, in 1944, the area of the United States in which rodent plague had been found, was extended by the discovery of infection in Oklahoma.

In Hawaii, five human cases of plague (all fatal) were reported in 1944, and considerable number of infected rodents and fleas were found all in the Hamakua District. (p. 554) makes the point that the

outbreak of plague in Ngamiland S Africa the biggest so far recorded in S Africa. An epizootic in gerbils had apparently initiated a secondary epizootic in the semi-domestic multimammate mice and this coincided with climatic factors which resulted in extensive flooding of the burrows of these mice with the result that the

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the fleas were not the main vector of the disease and that most of the fleas were without rodent hosts for much of the epidemic.

ROTHMAN (p. 34) describes an outbreak of bubonic plague in Dakar, noting that the disease is endemic there and that rodents along the coast are liable to epizootic plague. KARTMAN (p. 740) refers to the outbreak in Dakar and raises the question of the flea *Synsternus* as the most common house flea in the Dakar area is

COLE (p. 331) shows that the proportion of male *Xenopsylla* taken on rats varies with atmospheric temperature and suggests that flea indices should therefore be computed for female fleas only (which are not subject to the same variation). WHEELER and DOUGLAS (p. 35) distinguish between the infection potential, the vector potential, and the transmission potential of fleas and regard the product of these potentials as

— should be consulted

Pathology Treatment

In discussing the results of routine work on plague carried out during many years at the laboratory at Bukuru in the Belgian Congo, DEVIGNAT *et al.* (p. 330) report that in autopsies of guinea-pigs inoculated with plague material three types of disease were found: violent septicaemia with enlargement of liver and spleen; a moderate form with enlargement and

MAGROL and BRINOL (p. 926) describe an outbreak of plague in laboratory guinea-pigs in which the autopsy appearances were so unusual that plague was not at first suspected. Cultures were negative, and only Gram negative rounded bodies could be found in spleen smears. The authors suggest that these may be the only forms of *P. pestis* present in smears or lymph glands in the benign forms of plague.

CORNIL *et al.* (p. 216) report on the morbid anatomy and histology of guinea-pigs and rats inoculated by various routes with *P. pestis*.

BIHATY AGAR and SHRI ASTAVA (p. 840) report on

the envelope substance of the

bacilli (pure envelope serum), some by pure somatic serum, and some by whole antiplague serum; of pure sera, only the envelope type is protective, and this was confirmed by the leucocyte response investigated by the authors. The details of the cellular response to infection, under the conditions of the various experiments, should be sought in the original.

As a result of his experiments on blood culture in plague, GIRARD (p. 439) concludes that in a suitable medium, growth can be initiated if the inoculum contains no more than a single living plague bacillus. If blood culture is negative it is because there are no living organisms, and no flea could become infected by ingestion of that blood. In plague, the blood contains no bactericidal or inhibitory substances which could complicate growth conditions.

MACKAY-DICK (p. 128) writes of the value of sulphapyridine in the treatment of plague; if it is used in adequate amount (30-45 gm. total dosage), and if diagnosis has been made early in the disease, good results may be expected. The author insists on the importance of rest in bed during treatment. MATHUR and GOYAL (p. 217) report good results from the use of sulphathiazole in plague. They remark that this is now the standard treatment, which may be supplemented with coramine or other drugs as occasion demands. MAGROU (p. 926) treated 28 cases of plague with sulphadiazine; two of the patients died, but all untreated and unvaccinated cases were fatal. Sulphadiazine is therefore satisfactory, and the concurrent use of serum appears to be unnecessary; the dose given on the first day was, finally, 21 gm., and administration was continued, in diminishing doses, for 10 to 15 days. The drug was given in a large volume of fluid, and with at least 20 gm. of sodium bicarbonate daily to keep the urine alkaline.

WAYSON and McMAHON (p. 648) have compared streptomycin with sulphadiazine and sulphapyrazine in the treatment of plague in guinea-pigs and mice. Streptomycin evidently has considerable curative action but is, apparently, not so valuable as sulphadiazine. Sulphapyrazine is not so effective as sulphadiazine. HORNIBROOK (p. 741) also writes of the value of streptomycin in experimental plague; the results in a small series of mice indicated that it was possibly somewhat more effective than sulphadiazine under the conditions of the experiments.

GUPTA *et al.* (p. 1138) found that penicillin was useless in experimental plague in animals. MACCHIAVELLO (p. 647) has issued a set of instructions for diagnosis, treatment and isolation of patients with plague, and for the collection of suspected material. These must be sought in the original.

Control.

In the *Bulletin of the U.S. Army Medical Department* (p. 739) there is a reference to the outbreak of plague which occurred in Dakar in 1944 [see above]; there were 567 cases, and the case mortality rate was 91 per cent. This account is concerned chiefly with the extensive dusting campaign, with 10 per cent. DDT, which was undertaken to control the epidemic. Practically all persons in the affected districts were dusted, beneath their clothing, at ankles, waist, sleeves, neck and hair; and floors, walls and beds of houses were sprayed with 5 per cent. solution in kerosene. A survey of houses two weeks after treatment showed that almost all were free from fleas. This area is heavily infested with rats, but rat poison was not used because of its danger to children. ROTMAN (p. 34) notes that the French E.V. vaccine was also used as a control measure, and that severe reactions to it were not uncommon. SAVINO (p. 36), on the other hand, has used the E.V. vaccine in Argentina, and remarks that reactions to it were slight.

KALMBACH (p. 331) writes of the value of sodium fluoroacetate (known as compound 1080) in rat control—this compound is extremely toxic to rats and small rodents but is also dangerous to cats and dogs and possibly to man. The lethal dose for man is believed to be about one-fiftieth of one ounce—no data. See p. 618. Monell smelt good & the toxic people of rats.

finely ground maize or
in runways or on the
ANTU when used as a
against *R. rattus alexandrinus* even in high concentration

Charles W. Wilcocks

RABIES

VEERARAGHAVAN \ Cultivation of a Protozoal Parasite of the Central Nervous System *in vitro* and Its Relationship to Rabies *Indian J. Med. Res.* 1945 Oct. \ 33 No. 2 285-93

— A Rapid Method for the Diagnosis of Rabies in Animals *Ibid.* 295-7

In a previous communication [this *Bulletin* 1946 \ 43 194] the author described certain appearances in smears of the brain of rabid animals which he interpreted as due to the presence of a parasite supposed to be of a protozoal nature. In the two papers now under review he describes the successful cultivation of this organism in various media prepared from steamed emulsion of brain tissue and the employment of this culture method for purposes of diagnosis.

One of the most successful media consists of a mixture of six parts of one per cent sheep brain extract sterilized by steaming, one part of sheep serum and two parts of distilled water. The steamed brain extract is prepared from the brain of a sheep to remove all blood, homogeneous paste continued until a 2 per cent time the supernatant moderate speed. The clear fluid is then steamed in a sterilizer for half an hour on three consecutive days and tested for sterility.

Eight cc. of this medium are placed in each test tube and just before inoculation with material to be tested 10 drops of an emulsion of fresh brain tissue of a guinea pig one to two days old are added to each tube (one part of emulsified tissue and two parts of distilled water). The inoculum is from the clear supernatant fluid of a 20 per cent emulsion of the brain of the suspected animal which has been centrifuged for half an hour at 3,000 r.p.m. The cultures were incubated at 37°C. and smears were made at intervals of one hour. In most cases smears made after 4 hours culture and stained for 1 hour with Giemsa showed all the forms of the parasite described in the earlier paper. The virulence of the cultures was tested by various filtration processes and subsequent

other parasite rather than with a protozoal organism which was the cause of rabies. His claims in the two papers reviewed here do little to relieve these doubts, which can only be dissipated by further work.]

C. M. Wenyon.

VEERARAGHAVAN, N. Studies on the Cultivation of the Aetiological Agent of Rabies *in vitro* and Its Nature. *Indian J. Med. Res.* 1946, Oct., v. 34, No. 2, 207-24. [16 refs.]

The author has previously described a protozoal parasite in the central nervous system of animals suffering from rabies, which could also be seen in tissue cultures [this *Bulletin*, 1946, v. 43, 194, and above]. He considers this to be the causal agent of rabies. This view is supported by the present work, in which it is claimed that the causal agent can be cultivated in cell-free media. The medium employed consisted of steamed sheep-brain extract, serum, peptone, and glycerin. To this was added 10 per cent. fresh emulsified guineapig brain, which was stated to contain no intact cells on microscopical examination. The virus inoculum consisted of emulsified infected sheep brain, which had been centrifuged but not filtered. A rise in titre of virus was found after 19 to 24 hours' incubation at 37°C. In only one experiment (Ford Sterimat, FCB); here the titre of the virus was 1.10⁶ after 24 hours' incubation.

[Where the virus inoculum was not filtered it is probable that sufficient intact cells were present, even after emulsification, to permit of virus growth. In any case, the rise of titre found is not very great, and could be due to release of virus particles from disintegrating cellular material; incubation was not carried out for longer periods than 24 hours, a procedure which might have afforded more satisfactory evidence of multiplication.] D. J. Bauer.

VEERARAGHAVAN, N. Studies on Antirabic Immunization with Culture Vaccine. *Indian J. Med. Res.* 1946, Oct., v. 34, No. 2, 225-36. [15 refs.]

Tissue cultures of rabies virus, prepared as described in the previous paper, were used as a vaccine after the addition of phenol to a concentration of 0.5 per cent. The immunizing power of this vaccine was tested in guineapigs by a modification of Habel's mouse test [this *Bulletin*, 1941, v. 38, 161], and was found to be equal to that of the ordinary phenolized sheep brain vaccine. It also had the advantage of containing very much less inert brain protein. The titre of the virus contained in it was also higher (2.5.10⁶, as compared with 10⁵ in sheep), allowing a much smaller volume to be injected.

[The question as to whether the virus has multiplied or not does not of course affect the validity of the immunity tests, since the cultures were shown to contain virus by guineapig inoculation. It is, however, specifically stated that cultures were not satisfactory unless the original virus inoculum was heavy (36 cc. of 20 per cent. infected sheep brain suspension added to a total volume of 180 cc.) and this, together with the fact that the observed rise of titre was only one power of ten, suggests an increase in the effective number of infective units by disaggregation as much as by actual multiplication.] D. J. Bauer.

FREIRE MUÑOZ, C. Virus rábico fijo procedente del virus dominante en Montevideo. Proceso de la mutación y su estado evolutivo actual. [Fixed Rabies Virus from the Strain prevailing in Montevideo.] *An. Facul. de Vet.* Montevideo. 1945-1946, v. 4, No. 4, 483-503.

The authorities in Montevideo seem to have had some difficulty in obtaining a satisfactory vaccine against the locally prevailing strain of rabies virus. Advantage was, therefore, taken of the death of a year-old heifer dying of

rabie
dog
in 7-

was used as the starting point for obtaining a fixed virus. The process is described in detail with protocols showing the times of reaction at various stages through dogs first then rabbits and now at the 196th passage a virus has been obtained apparently fixed with an incubation period of 7 days.

H. Harold Scott

PIEDROLA GIL G & DIEZ MELCHOR F. Algunas experiencias sobre la inmunidad en la rabia [Experiments on Immunity to Rabies] *Med. Colonial* Madrid 1946 Dec 1 v. 8 No 6 423-9

Preventive vaccination against rabies is one of the milestones along the road of scientific advance but there are well known instances in which death has occurred in spite of vaccination in the proper way and started in good time. The authors have therefore taken up afresh the study of immunity to rabies and in this paper record two series of experiments.

In the first they inoculated into rabbits subcutaneously in 2 cc. doses increasing concentrations reaching 1/50 by the tenth. The temperature was made of temperature

drawn from the heart and the serum separated. A 1 per cent emulsion of the virus was added in the proportions of 1:1 up to 1:8 serum and the tubes placed in the incubator at 37°C for one hour then for 24 hours in the ice chest after which guinea-pigs were inoculated intracerebrally with 0.3 cc. and kept under observation for 40 days.

Results showed that the rabbits differed greatly in the strength of antirabic serum they produced: one would neutralize the virus in a dose of 2 cc. serum another would need 7 cc. and others would be intermediate with 2.4 and 5 cc. Next the rabbits whose serum was thus protective were inoculated intracerebrally with the virus but all died: one on the 8th day, five on the 7th day and one on the 6th day (one of the eight had been found dead in its cage the day after the blood had been taken).

In the second series of experiments rabbits in lots of three were inoculated: one lot with 0.4 cc. of 1 per cent virus emulsion inactivated (? preserved) by quinosol; a second lot with 0.4 cc. of cerebral emulsion 4 per cent with 1 per

nervous system after repeated inoculation of the same virus intracerebrally.

H. Harold Scott

PIEDROLA GIL G & BENITEZ CALVO L. A. La glucemia en la rabia experimental del conejo [Blood Glucose in Experimental Rabies in Rabbits] *Med. Colonial* Madrid 1947 Mar 1 v. 9 No 3 222-34 7 figs

GREENWOOD M. Tenth Report on Data of Anti-Rabies Treatments supplied by Pasteur Institutes. *Bull. Health Organisation* (League of Nations) 1945/46 v. 12 No 3 301-64

This is the tenth and final review of data of anti-rabies treatment supplied by Pasteur Institutes to the Health Organisation of the League of Nations. The

nine preceding reports had been entrusted to the late Colonel McKendrick and this report follows the lines of his work. The report deals with nearly a quarter of a million treated cases with 483 deaths and with the results obtained from the whole series which comprise over one and a quarter million treated cases, with 4,023 deaths. The data have been analysed in great detail by the ten methods of treatment; by race, European and non-European; species of biting animal; evidence of rabies in the biting animal; severity of bite; intervention of clothing; position of bite; delay in commencing treatment; paralytic accidents. In reviewing the results obtained from the data, Professor Greenwood came to the conclusion that a continuation of the laborious task of compilation and arithmetic analysis would never decide whether any vaccine was superior to any other. The main reason for this conclusion was the inability to make any direct comparison between the various methods since each Pasteur Institute, generally, relied on one routine method of prophylactic treatment. It was therefore impossible to get a strictly comparable series of cases—in theory the persons compared, in each treatment group, should be of the same race, have been bitten at the same time by the same species of animal, in the same site and with the same degree of severity and to have come under treatment at the same interval after injury. In addition to this important factor there is the probability that a considerable difference existed in the routine adopted by the various institutes in their follow-up for the after-histories of the patients—CUNNINGHAM and MALONE showed, for Indian data, that complete follow-up was very important. Another possible source of heterogeneity is variation in infectivity of strains of natural rabies in time and place. The very small number of deaths recorded everywhere was also a disturbing factor; regional variations might seriously affect any statistical inference.

Professor Greenwood also reviewed Dr. VAN STOCKUM's theory for judging the efficacy of a vaccine by using the ratio of deaths with an incubation period of less than 31 days to those with a longer incubation period. He found that no decisive conclusion could be drawn in favour of her new statistical method and that the results he obtained did not substantiate her sweeping condemnation of some methods of prophylaxis.

The results of this lengthy investigation do not fulfil the expectation of those who planned the enquiry 20 years ago. The suggestions and criticisms offered by Professor Greenwood should be extremely helpful to those who may plan any further enquiry on this subject.

W. J. Martin.

RAYNAL, J. H. & LIEOU, Y. C. Vaccin antirabique phéniqué à base de substances nerveuses autres que celles du lapin. Disparition des incidents de choc. [Elimination of Shock by using Nervous Substances other than Rabbit Tissue in Phenolized Antirabic Vaccine.] *Ann. Inst. Pasteur.* 1946, Sept.-Oct., v. 72, Nos. 9/10, 832-3.

The following is a translation of the authors' summary.
To avoid the accidents recorded during preventive treatment of rabies by phenolized vaccine, it is advisable to avoid the use of rabbit brain in preparing the vaccine. Dog or sheep brains may be used with advantage; in addition, the virulent nervous substance of the latter constitutes a better antigen than that of the other animals.

H. J. O'D. Burke-Gaffney.

ZABLUDOVICH, S. Accidentes por vacuna antirrábica. Síndrome pseudo peritoneal y parálisis facial bilateral sucesiva. [Accidents following Vaccination against Rabies: Pseudo-Peritoneal Syndrome and Bilateral Facial Paralysis.] *Diálogo Médico.* 1946, Sept. 30, v. 18, No. 40, 1454, 1456-8. [33 refs.]

BUSSELL L J Myelitis after Antirabic Vaccine Report of a Fatal Case
Lancet 1946 Dec 7 826-7 4 figs

and again from October 31 to November 14. On November 18 he developed pain and fibrillary twitching in the left upper arm and shoulder. The temperature was raised. On November 21 neck rigidity and head retraction developed and there was a complete flaccid paralysis of the left arm. Kernig's sign was positive. The patient died on November 22 with head retraction, fibrillary twitching in right arm, chest and abdominal muscles, there were spasms of the facial muscles and he could not articulate or swallow properly. The CSF showed a cell count of 120 per cmm, chiefly lymphocytes. Pathological investigations were carried out by Professor Vittorio Cilli at Asmara. The brain was virtually normal. The cord showed an acute haemorrhagic
 cells
 rabies

[Neuroparalytic accidents after anti-rabies vaccination are usually divided into the Landry type, the dorso-lumbar. The features of this case would appear meningeal signs as described by Gordon
Bulletin 1938 (30 603)
 A J Rhodes

PASCOLANT P & KREISBERGER J Polyradiculonevrite après vaccination anti-rabique (Polyneuritis following Anti-rabic Vaccination) *Bull et Mém Soc Méd Hôp de Paris* 1946 Nos 18/19 295

MALARIA

FONTAN A, VERGER P, MOULIÈS A & MARTIN C Sur un cas de paludisme autochtone de la région bordelaise observé chez un nourrisson de 6 mois [An Autochthonous Malarial Infection in an Infant in the Bordeaux Area.] *J Méd de Bordeaux* 1947 Mar (124 No 3) 128

A severe *P. vivax* infection occurred in a 6-months-old infant near Bordeaux where malaria is not endemic. The mother was working in a

KOLSSITASSEFF Malaria in Bulgaria *Bull Office Internat d Hyg Publique* 1946 July-Aug-Sept (37 Nos 7-8-9) 647-8 [Trench version 645-6]

The climate of Bulgaria is sub-tropical and in many other respects it provides conditions favourable to the dissemination of malaria. The low lying country, alluvia of various rivers and the marshes bordering the Danube and the Black Sea favour mosquito breeding. Among the five prevailing anopheline species three are known to transmit malaria, namely *A. maculipennis*, *A. superpictus* and *A. sacharovi* having respective indices of infection of 0.8, 1.5 and 2.5 per cent.

A. maculipennis is the most widely distributed and the most dangerous vector: *A. sacharovi* is most abundant near the Black Sea: and *A. superpictus* is found in the Southern area, the 17 occupied regions and the 17th Region districts; it appears later, in July, malaria in the late summer a evidence.

The people work in the fields in summer, often spending the night there, and much of their activity is devoted to the cultivation of rice. Furthermore, the pottery and mining industries, quarrying, and railway construction, lead to the formation of many ponds and marshes, so that mosquito-breeding is extensive.

their houses. In 1945, the index was 9, compared with 16.2 in 1942. The parasite index for over 200,000 blood examinations was 27.2 per cent., compared with 44.8 in 1942. Both splenic and parasite indices have, in fact, been falling steadily during the last four years. Mortality from malaria is also stated to have decreased rapidly in recent years. In 1945, there were 7 deaths from malaria and 6 from blackwater fever (previous figures are not given). The decrease in malaria morbidity and mortality in 1945 is attributed largely to "the anti-malaria measures imposed". [It is to be regretted that means whereby these high figures were successfully reduced are not stated in an otherwise informative paper.]

H. J. O'D. Burke-Gaffney.

LUPPOVA, N. N. [Malaria in the Chuvash Republic during the Great Patriotic War.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 25-35. [In Russian.]

The author describes the epidemiological conditions relevant to malaria in the Chuvash Republic (Volga region) during the last war.

Among the factors affecting its spread, some were favourable, others were not. Thus, an increase of the mosquito-breeding area, migrations of the population and the curtailment of anti-malaria measures, tended to increase the incidence. On the other hand, meteorological conditions in 1941, 1942 and 1944 had a harmful effect on the development of mosquitoes, but helped to preserve the livestock, furthermore the immigrants, comprising 10 per cent. of the local population came from areas where the incidence of malaria was not higher than that in the Chuvash region. These factors counteracted the effect of those which favoured the spread of infection, with the result that the incidence of malaria in the Chuvash republic during the war did not exceed the incidence before it, and dropped considerably in 1945 as the result of improved anti-malarial measures.

C. A. Hoare.

BERLEMISHEV, V. N. [The Influence of Migration on Malaria during the Great Patriotic War and the Necessary Control Measures.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 3-24. [In Russian.]

The rôle played by the re-shuffling of the population in the production of epidemic outbreaks of malaria is well-known, and acquires particular importance during the post-war period. While the medical authorities of Britain and the United States are concerned about the introduction of malaria by returning troops and prisoners of war, in the Soviet Union the problem is more complicated owing to mass movements of both the population and troops, following military operations which involved almost the entire country.

The author first considers various types of migrations and their possible effect upon the local malariological situation. In the course of these migrations,

parasite index of 2.8 per cent. On the east coast no evidence of endemic malaria was found north of Sainte Marie. On the west coast Saint Pierre, Carbet, Case Pilote, Schoelcher and Fort-de France appeared to be free from malaria. Malaria was present in all inhabited localities on the south coast except Marin. The prevalence of malaria varies from year to year but is never very high.

The spleen index of the schoolchildren mentioned above was 3.8. There was a discordance between the parasite rates and spleen rates due to the fact that schistosomiasis (*S. mansoni*) which is much more prevalent in Martinique than is malaria also causes hypertrophy of the spleen.

It appears that *A. tarsimaculatus* is the chief if not the only vector of malaria.
Norman White

MACKERRAS, I. M. The Australasian Anophelines as Vectors of Malaria. *Med. J. Australia* 1947 Jan 4 v 1, No 1 1-8 27 refs

The factors which make for success in malaria transmission by anopheline mosquitoes (susceptibility to infection, abundance, association with man, avidity for human blood and longevity) are discussed in a general way and then considered more particularly with reference to certain Australasian species.

The author lists these species in the following approximate scale of importance as proven dangerous vectors: *Anopheles punctulatus punctulatus*, and *A. p. farauti*, potential vectors under locally favourable conditions, *A. annulipes*, *A. bancrofti bancrofti*, *A. subpictus*, *A. amictus hilli* and *A. amictus*, unknown but locally significant, *A. maraukerensis* and *A. roaguineusis*, but it is not

farauti are clearly recognized. *A. p. farauti* occurs on all the larger and most of the smaller islands north of Australia from the Moluccas to the New Hebrides. On the mainland it is found in north-east Queensland and scattered in the Northern Territory. *A. p. punctulatus* is more restricted in range, being absent from New Hebrides and from the mainland of Australia.

The intermediate forms such as *koliensis* seem to occur wherever the others are present together but have not been recorded where either is alone. The biology of *koliensis* is worthy of further investigation but the weight of evidence seems to show that it is a hybrid.

A. annulipes is presumed to be the vector of sporadic malaria in the south, for, though the species exhibits no particular association with man, yet it is capable of malaria transmission as for example, when a camp is established near its breeding place and other conditions are suitable.

A real danger that should be widely recognized is the possibility of the introduction of the highly efficient vector *A. p. punctulatus* from the islands into the tropical, humid regions of the northern part of the Australian mainland.

H. S. Leeson

WHEELER, A. H., McDERMOTT, Elizabeth B., ADLER, J. & KAHN, R. L. Studies on Serology of Malaria. II. Hemoglobin Precipitation with Lipid Antigen. *J. National Malaria Soc.* 1946 Sept v 5 No 3 209-22

HULL, R., LOVELL, B. J., OPENSHAW, H. T. & TODD, A. R. Synthetic Antimalarials. Part XI. The Effect of Variation of Substituents in Derivatives of Mono- and Di-Alkylpyrimidines. *J. Chem. Soc.* 1947, Jan., 41-52

PETERKIN, G. A. G. & HAIR, H. C. Preliminary Report of a Dermatosis due possibly to Mepacrine. A Description of 26 Cases seen in Italy. *Brit. J. Dermat. & Syph.* 1946, Nov.-Dec., v. 58, Nos. 11/12, 263-71, 4 coloured figs. on 2 pls.

In 3 of these cases mepacrine caused an exacerbation of the eruption. The authors do not consider that the low incidence of the eruption following the use of mepacrine justifies a contraindication to the general employment of that drug.

H. J. O'D. Burke-Gaffney.

ROBIN, C. & BROCHEN, L. Le paludisme à Dakar. Résultats d'une campagne curativo-préventive antipalustre, à l'aide des médicaments synthétiques, en milieu indigène. [Malaria in Dakar. Results of the Therapeutic and Prophylactic Administration of Synthetic Drugs in a Native Population.] *Bull. Méd. de l'Afrique Occidentale Française.* 1946, v. 3, No. 1, 97-108.

Anopheles gambiae and *A. pharoensis* occur in Dakar, the former predominating. Parasite indices reported in 1919, 1922 and 1929 were 39, 42.3 and 24.1 per cent., respectively. These were all determined in the endemic season. The considerable decrease in malaria prevalence noted in 1929

falciparum, the remainder by *P. malariae*.

In 1943, work was started in creating a protected area around Dakar but much remains to be done. Once it has been completed the attempt will be made to eliminate the human carriers of infection in the city. In the meantime efforts were directed towards dealing with native infants and young children, the most important sources of infection, in a heavily infected part of the town. Two hundred and twenty-three children were treated with quinacrine and rodo-prequine between the 30th July and the 1st of December. The treatment began and ended with three days quinacrine followed by three days rodo-prequine. In between these two courses quinacrine or rodo-prequine was given on 10 days at various intervals: drugs were given on 22 days in all. Quinacrine tablets each contained 0.1 gm.; rodo-prequine tablets 0.01 gm. Children aged 0 to 1 each received half a tablet; 1 to 3 years, one tablet; 3 to 5 years, one and a half tablets; 5 to 6 years, two tablets. The reduction in parasite and spleen rates was marked. The very few children who harboured parasites at the end of treatment had been irregular in their attendance at the dispensary. Enlargement of the spleen caused by *P. malariae* rapidly disappeared.

Norman White.

DICK, G. W. A. & BOWLES, R. V. The Value of Plasmoquine as a Gametocide in Sub-Tertian Malaria. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 447-50.

The observations recorded relate to a group of adult Somali enlisted soldiers and to the Somali inhabitants, of all ages, of an isolated village in the Nogal Valley. All patients suffering from *P. falciparum* malaria were treated with quinine sulphate in a mixture, 10 grains *t.i.d.*, for 3 days, and then atebirin 0.1 gm. *t.i.d.* for 5 days. Every alternate patient showing crescents in the peripheral blood at the completion of this treatment were treated with plasmoquine 0.01 gm. [frequency not stated, but presumably *t.i.d.*] for 3 days. Sodium

citrate, 30 grains was given with each dose of plasmoquine. No toxic effects

46 patients were treated with plasmoquine

Norman White

GRAINGER W E The Experimental Control of Mosquito Breeding in Rice Fields in Nyanza Province, Kenya, by Intermittent Irrigation and other Methods *East African Med J* 1947, Jan v 24 No 1 16-22

A wartime increase in the amount of wet rice grown in Kenya provided an opportunity and the need to test methods of anopheline control and to measure at the same time their effect on the crop

than one tenth of the control plot figures

The effects on the rice crop are presented in two tables of seasonal results, showing the weight of grain and of straw the average height of crop and the

G Macdonald

FLOCH H & ABONNENC E Poissons larvivores de la Guyane Française (Larvivorous Fish in French Guiana) *Institut Pasteur de la Guyane et du Territoire de l'Inini Publication No 132* 1946 Aug 6 pp 2 figs

MATHIS W V FERGUSON F F & SIMMONS S W Comparative Studies of DDT Dusts, DDT-Oil Sprays, and Paris-Green Dusts used routinely in Anopheline Larvae Control *Pub Health Rep Wash* 1947 Jan 17, v 62 No 3 95-102

This paper presents an analysis of the comparative values of DDT dust, sprays and mists and paris green in anopheline mosquito control. Standard techniques were used to distribute them and to measure their efficacy. The dose of DDT aimed at with all preparations was 0.1 lb per acre and of paris green 1 lb per acre.

Powdered DDT was applied in the form of a 1 per cent mixture at first with a kaolin type clay later with pyrophyllite. For surface spraying the

of 1.25 per cent DDT 0.5 per cent B-1956 in fuel oil by spraying into the air from a pressure sprayer working at 30 to 50 lb per square inch and fitted with an atomizing nozzle

The relative efficiency of the four methods is assessed in a series of tables which may be summarized as follows:—

Preparation	Larval reduction at 24 hours	Larval reduction at 1 week
DDT in kaolin	99 per cent.	57 per cent.
DDT in pyrophyllite	84 ..	16 ..
Paris green in lime	72 ..	24 ..
DDT spray	98 ..	32 ..
DDT-in-oil mist	84 ..	82 ..

Analysis of the labour and transport involved in the different methods showed that for all types of work the mist was cheapest in labour costs, and the spray entailed least use of transport. The authors consider that the mist is the most generally useful method. These comparative values are illustrated in the following table:—

Comparison of larviciding operations in terms of dosage of active ingredients and man-hours involved.

Larvicide	Ditches 10 feet or less in width		Ditches and ponds greater than 10 feet in width	
	Man-hours/100 linear ft.	Pounds/100 linear ft.	Man-hours/acre	Pounds/acre
DDT-oil emulsion	0.13	0.0016	4.10	0.05
DDT-oil mists ... ..	.06	.0038	1.70	.13
DDT dust ... ..	.10	.0056	3.74	.24
Paris-green dust ... ..	.09	.04	3.10	1.71

(All figures based on records from March 1st to October 19th, 1945).

G. Macdonald.

FERGUSON, F. F., ARNOLD, E. H. & UPHOLT, W. M. Control of Anopheline Mosquito Larvae by Use of DDT-Oil Mists. *Pub. Health Rep.* Wash. 1947, Feb. 28, v. 62, No. 9, 296-302.

The commonly used spray larvicides for mosquito control involve the application of 12 to 16 gallons per acre. One of the first DDT preparations to be used for this purpose was a quick-breaking emulsion; it was applied at about the same rate. was very

Experimental tests have been made with air atomizing sprayers applying fuel-oil solutions of DDT at the rate of 1 (U.S.) gal. per acre [equals 4/5 U.K. gallon]. An air pressure of 50 to 30 lb. per sq. inch was used, which gave an output of 3 gal. (U.S.) per hour, and particles from 70 to 220 microns (mostly 100-125), in a 30 to 40 foot swathe with a slight wind. The DDT rates of 0.1 lb. and 0.05 lb. per acre were equally effective whether applied in this fine spray or in a 12 gal. diluted emulsion. Since 0.1 lb. per acre is sometimes toxic to fish, the 0.05 lb. per acre rate is advised for routine treatments.

J. R. Bussvine.

UPHOLT, W. M. The Inactivation of DDT used in Anopheline Mosquito Larvicides. *Pub. Health Rep.* Wash. 1947, Feb. 28, v. 62, No. 9, 302-9, 1 fig.

This is an account of laboratory experiments performed to investigate the factors existing in anopheline breeding areas which cause loss of effectiveness

of DDT in larvicides when applied at dosages adequate for high initial mortality and safe to other aquatic life

It is made clear that inactivation of the DDT in nature is caused by many factors. The greater part of the investigation was concerned with the adsorption of DDT on mud—many of the experiments are discussed in detail. Adsorption is a slow process and appears to be on the organic components of the mud as sand is a relatively poor adsorbent. Other points discussed are wind and wave action which drive the DDT preparation to one side and leaves areas clear of DDT, precipitation which removes DDT from the water surface, and volatilization and chemical decomposition. Regarding which chemical methods were not sufficiently accurate when working with such small quantities to provide conclusive evidence.

It is suggested that it might be possible to find a non-toxic substance to mix with the DDT which might be more readily adsorbed on the mud thus preventing the adsorption of the DDT itself. H. S. Letson

TRAITS B. V., MAPLE J. D., HURLBUT H. S. & HUSMAN C. V. Cub Airplanes in the South Pacific for Application of DDT. *J. Econom. Entom.* 1946 Dec. v. 39 No. 6 726-8

Application of DDT as a mosquito larvicide by means of Cub airplane was demonstrated to be very effective in the South Pacific. No area was observed where *Anopheles farauti* Laveran or *Culex annulirostris* Skuse could not be controlled with an application of 2 quarts of a 5 per cent oil solution or a 5 per cent water emulsion of DDT applied by air.

DAVEY D. G. The Use of Avian Malaria for the Discovery of Drugs Effective in the Treatment and Prevention of Human Malaria. II.—Drugs for Causal Prophylaxis and Radical Cure or the Chemotherapy of Exo-Erythrocytic Forms. *Ann. Trop. Med. & Parasit.* 1946 Dec. v. 40 Nos. 3-4 453-71 [34 refs.]

This interesting and important paper was inspired by the observations of JAMES [this *Bulletin* 1937 v. 34 589] and of YORKE and MACFIE [this *Bulletin* 1925 v. 22 50] that sporozoite-induced and blood-induced infections of human

erythrocytic development of *Plasmodium gallinaceum* and its resistance to quinine. An added significance was given to the previous observations, and Davey realized that in the search for drugs of value as causal prophylactics it was necessary to concentrate on those which acted specifically on exo-erythrocytic stages of malarial parasites. The paper under review describes his earlier

experiments. Inoculations were negative. From the fact that parasites were shown to be continuously present in the circulating blood between 36 hours and 72 hours he deduced that these were probably erythrocytic forms. The reason for this deduction is not clear.

The author's next step was an attempt to determine the early history of the inoculated sporozoites. In this he was unsuccessful, except for the finding of two parasites in the spleens of chicks inoculated 30 and 40 hours previously. This work was performed in 1943, before the work of HUFF and COULSTON [this *Bulletin*, 1945, v. 42, 538] had appeared (and before there was access to the still earlier and very similar work of REICHENOW and MUDROW with *Plasmodium praecox* [this *Bulletin*, 1944, v. 41, 190]*). However, enough had been learned to draw certain conclusions.

Thus, in the first place, it had been established that the sojourn of the sporozoites in the blood was of such a duration that they could exert their effect to their action on the metabolic processes of the parasite.

Secondly, this transient blood stage was followed by one of 36 hours: exclusive development in some other tissue, during which it would be possible for a drug to act on the first generation of exo-erythrocytic forms.

Thirdly, parasites were found to reappear in the blood after 36 hours and were then continuously present.

Finally, neither quinine nor mepacrine was found to affect the exo-erythrocytic development at any stage, and so could neither protect nor cure, but pamaquin had some action on the exo-erythrocytic forms of *P. cathemerium* and also acted as a causal prophylactic in human malaria and lowered the relapse rate in benign tertian malaria.

The analogies between the types of avian malaria being studied and benign tertian malaria were now considered sufficiently close to justify a study of the chemotherapy of exo-erythrocytic forms in avian malaria.

The next part of the paper is devoted to these tests and although the original paper must be consulted for the details, an indication is given below of the main results and conclusions.

For all the tests, 6-day-old chicks were employed, each of which received an intravenous inoculum equivalent to one pair of infected mosquito salivary glands.

The action of drugs against exo-erythrocytic parasites was tested by their effect on the course of infection in the test chicks after these were inoculated by the standard methods noted above.

In an untreated chick the exo-erythrocytic forms, scanty at first, multiply rapidly until, by the 7th day after inoculation, or soon after, the brain capillaries may be blocked by them and the chicken dies of a cerebral anoxia. The time of death so caused occurred over a narrow time range of 3 to 4 days under the standard conditions of the experiments, so that the effect of using various test drugs could be easily assessed by their efficacy, or otherwise, in delaying the course of infection and day of death, or by producing actual cure.

All drugs used were given by the mouth, the first dose being administered about two hours before infection, the second three to four hours after and subsequent doses twice daily for five days. The treatments stopped, therefore, one day before deaths in untreated birds would be expected and the drug was thus given full time to produce its action against exo-erythrocytic parasites. The criteria of cure were that the blood of chicks was examined for 3 to 4 weeks after cessation of treatment and, if the results were negative, 1 ml. of blood

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was inoculated into a normal chick which in turn was kept under observation for three weeks

The action of the various drugs tested is indicated in the paper in tabular form and the original table should be consulted for details but the most important results may be summarized as follows —

Mepacrine and quinine apparently are inert against exo erythrocytic forms of *P. gallinaceum*

Paludrine is a complete causal prophylactic against *P. gallinaceum* infections by its action on the exo erythrocytic forms provided treatment commences within 4 days of infection with sporozoites

In other sections of the paper the author describes the action of various drugs on infections of *P. cathemerium*, *P. relictum* and *P. lophurae*. Some of his speculations with regard to the type of cell invaded by exo-erythrocytic forms in the early and later stages of infection as well as on other points may require modification as knowledge accumulates but they can only be regarded as reasonable deductions from the knowledge in his possession at the time of writing the paper

As indicated earlier in this review the paper is a model in the presentation of experimental work and a contribution to the chemotherapy of avian malaria which has led directly to important applications in human malaria

H. E. Shortt

DAVEY D. G. CURD I. H. S. Researches on the Chemotherapy of Malaria. I. The Biological Approach [DAVEY *Glasgow Med J* 1947 Mar \ 28 No 3 67-72 [16 refs. II The Chemical Approach (CURD) *Ibid* 73-9 [13 refs.]

Admirable brief reviews of recent researches based on the authors work frequently summarized in this *Bulletin*

HAWKING F. Activation of Paludrine *in vitro* [Correspondence] *Nature* 1947 Mar 22 409

It was recently found by TOSKIN [this *Bulletin* 1947 \ 44 184] that paludrine in concentrations of 2 to 5 mgm per litre had no effect on exo erythrocytic forms of *P. gallinaceum* growing in tissue culture. Further experiments with the same drug on these forms and on blood forms of *P.*

the control culture in which the serum of the donor monkey was used the

drug treated animal were respectively $\frac{1}{4}$, $\frac{1}{16}$ and $\frac{1}{32}$ [the actual concentrations of drug present are not stated] tubes directly to give a concentration of 1 and 2 mgm per litre of medium. The development of parasites in the control tubes resembled that in the control tubes in cultures containing serum from the animal. In control experiments with exo erythrocytic forms similar results were obtained. The concentration of drug undergoing chemical change in the body of the malarial animal

McKEE, R. W. & GEIMAN, Q. M. Studies on Malarial Parasites. V. Effects of Ascorbic Acid on Malaria (*Plasmodium knowlesi*) in Monkeys. *Proc. Soc. Exper. Biol. & Med.* 1946, Nov., v. 63, No. 2, 313-15. [11 refs.]

Using the method of MINDLIN and BUTLER [*J. Biol. Chem.*, 1938, v. 122, 673] for determining plasma ascorbic acid and of BUTLER *et al.* [*ibid.*, 1943, v. 150, 453] for determining ascorbic acid in whole blood, the authors found that the average plasma level of ascorbic acid for 20 monkeys (*Macaca mulatta*) parasitized with *P. knowlesi* was only 0.24 mgm. per cent. The average plasma level in non-parasitized monkeys was 0.56 mgm. per cent.

During the course of studies on 120 monkeys, seven, inoculated with parasites, had no plasma ascorbic acid and less than 0.1 mgm. per cent. in the whole blood. The animals were receiving a well-balanced diet. These seven monkeys showed abnormal courses of parasitaemia: there was only a slow rise in percentage of parasites after inoculation and a gradual spontaneous control of the infection. Into four of these animals ascorbic acid was injected intramuscularly; a significant increase in the number of circulating parasites followed these injections. Withholding ascorbic acid for more than 7 days after infection appeared to give the spontaneously deficient monkeys time to produce an immunity and to control the infections.

Two other monkeys were made ascorbic acid deficient by removing the vitamin from their diet. In them the abnormal course of parasitaemia observed in the first group of monkeys was also observed.

Studies are being continued with simian and human
Norman White.

TRYPANOSOMIASIS.

FAIRBAIRN, H. & CULWICK, A. T. A New Approach to Trypanosomiasis. With a Statistical Analysis by F. L. GEE. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 421-52, 9 text figs. & 37 figs. on 5 pls. [26 refs.]

The authors state that, in the past, trypanosomes "have been regarded rather as fish swimming in a pond, and their reactions to their environment have usually been reviewed from this aspect." The problems of trypanosomiasis can, however, in their view, be looked at from the angle of physical chemistry if the trypanosome is considered as a "partially deformable bladder, free to move within certain limits, . . . and carrying an electric charge which may be either positive or negative." [The last point was established by the reviewer

differentially, and (b) the chemical composition of the environment. Since red blood corpuscles carry a negative charge, the positively charged trypanosomes are constantly subjected to attractive forces, and the negatively charged ones to repulsive forces. These will tend to make the positively charged variants (PV) describe paths close to negatively charged red cells, whereas the negatively

charged variants (NV) will move more remotely. On a thin blood film therefore one would expect to find PV forms in proximity to the red cells and NV

and also the extent of deformation of their adjacent borders were measured. When these results were analysed the deformation was found to vary inversely with the distance between the centres of the red cells. The proportion of PV and NV forms was then determined on stained films by the relation of the trypanosomes to the adjacent red cells and by the salt concentration test (this Bulletin *loc cit*). The results were found to be in close agreement.

The same attractive and repelling forces should lead to the NV being shorter than the corresponding PV forms. This prediction was tested by investigating the length distribution curves of the two variants in *T. rhodesiense* infections. During this work it was noted that apart from the usual differentiation into long and short (stumpy) forms the long forms could be further divided into two morphological groups. In one group the trypanosomes had long narrow posterior extremities with the kinetoplast some distance from the posterior end.

each subdivided into positively or negatively charged types. The lengths of the members of each subgroup were normally distributed about the mean values and as predicted it was found the mean value of the PV of each group was significantly greater than that of the corresponding NV.

In an appendix statistical analysis by an independent worker is given. The composite curves derived from these measurements are broken down into six normal curves with means almost identical with those obtained by the other method.

tion involving the alteration of heritable characters. They can be explained in the authors' opinion only by assuming that trypanosomes undergo syngamy

the posterior end of the other. This fusiform body elongates and after a variable period of time divides at its centre producing two trypanosomes. [Those interested in the question of the validity of this claim to have observed a true sexual cycle should consult the original and examine the accompanying plates. The process as the authors state is quite different from that described by VANDERPLANK this Bulletin 1944 v. 41: 829.]

From these experiments the following results emerge.—Individuals of the three forms—long, intermediate, short—could fuse with others of the same or different groups but some indication was obtained that fusing occurred only between trypanosomes with electric charges of different sign. The long form can multiply by binary fission but the intermediate and short forms cannot do so (or only rarely). The latter forms are produced by syngamy between long forms. Syngamy between short and intermediate forms produces long forms. Metacyclic trypanosomes from the salivary glands of tsetse flies also consist of two types, one longer than the other, and also probably of individuals of different electric charge.

[Whether the authors' hypothesis is correct or not it is impossible to say. Its value, however, can be assessed from the extent to which, on the one hand, it can explain known facts and, on the other, can indicate new lines of fruitful work. The second criterion has certainly been fulfilled because a large body of new facts has been amassed, even if their interpretation is still open to discussion and lines for further work have been suggested. Whether the hypothesis can adequately explain known facts is perhaps more questionable. Taking for example the serological reactions of trypanosomes, the authors have considered one case described by the reviewer and his colleagues in which the antiserum prepared against a positively charged variant of *T. evansi* reacted with the homologous trypanosomes but had no effect on a negatively charged relapse variant of the same strain, whereas the antiserum prepared against the N.V. reacted with both. This, they say, is to be expected; adhesion with the P.V. involves the breaking down of the "protective" action of whatever substance inhibits adhesion; adhesion of the N.V. involves this too but, over and above, it necessitates the suppression of the mutual electrical repulsion of the corpuscles and the negatively charged trypanosomes. The anti-N.V. serum has to do all the anti-P.V. serum does and more, so it is to be expected that it would cause adhesion of both variants. From one angle this explanation seems an oversimplification. Adhesion of sensitized trypanosomes differs greatly from the lectric charge:—electrolyte concentrations are sion; the presence of complement is essential; the indicator, and even then the cells of only certain individuals are satisfactory for the test. From another angle the explanation is inadequate. In the paper from which this example was taken, another case was described in *T. brucei* where anti-P.V. serum and anti-N.V. serum each reacted only against the homologous trypanosomes. In a later paper a further instance is given in which anti-P.V. and anti-N.V. sera were again specific. Tsetse flies were fed on one or other of these variants and the salivary glands were later used to infect rats. The resultant infections in the rats consisted predominantly of of the sign of the charge of the prepared against the original

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J. C. Broom.

[Comparable experiments on *Sp. recurrentis* will be described in an abstract in the September number of this *Bulletin*.—Ed.]

PACKCHANIAN, A. & SWEETS, H. H., Jr. Infectivity of *Trypanosoma cruzi* after Cultivation for Thirteen Years *in vitro* without Animal Passage. *Proc. Soc. Exper. Biol. & Med.* 1947, Feb., v. 64, No. 2, 169.

The organism was kept on N.N. medium for 81 subcultures.

DIAS, E., LARANJA, F. S. & NOBREGA, G. Doença de Chagas [Chagas's Disease.] *Mem. Inst. Oswaldo Cruz.* 1945, v. 43, No. 3, 495-582, 49 figs. & 2 coloured pls. [80 refs.]

A detailed treatise.

LEISHMANIASIS

- HIRD A J Kala-Azar A Description of Four Cases occurring in a Glasgow Hospital *Glasgow Med J* 1947 Mar v 28 No 3 80-87 2 figs [16 refs]
A brief review of cases seen in Britain with an account of four recent ones

- DIDIER R Un cas de kala-azar infantile guéri par la diamidine ou 4-4 diamidine diphenoxypentane A Case of Infantile Kala Azar cured by Pentamidine *Algerie Med* 1947 Jan No 1 45-8

- SEN GUPTA P C Cerebral Lesions in Dogs following Injections of 4-4-Diamidino-5-stilbene [Correspondence] *Trans Roy Soc Trop Med & Hyg* 1947 Mar v 40 No 4 508-10

OASTLER and FIDLER reported this *Bulletin* 1946 v 43 1029] central nervous system lesions of a constant type in dogs treated intravenously with solutions of 4-4-diamidinostilbene which had been autoclaved at 5 lb pressure for 20 minutes before use Spasticity was a marked clinical feature

reviewer's opinion it is quite improbable that autoclaving of the solutions produced any alteration in the drug since it is the salt of a strong acid and strong base and boiling of its solutions is carried out during purification Moreover Oastler and Fidler appeared to be well aware of the possible photochemical changes previously described (this *Bulletin* 1943 v 40 23) *J D Fulton*

FEVERS OF THE TYPHUS GROUP

- HAMMARSTROM E HELLEN H & TÄHRÆUS J Serologiska och kliniska iakttagelser vid fall av epidemisk flaktyfus i Sverige 1945 [Serological and Clinical Observations in Cases of Epidemic Typhus in Sweden 1945] *Nordisk Med* 1947 Mar 14 v 33 No 11 700-706 5 figs [13 refs]
English summary

Four hundred cases of typhus occurred in refugees from German concen

1/120 was taken as the upper limit of normal in the rickettsia agglutination test

In the 104 cases investigated, specific agglutinins were demonstrable with the rickettsia test on the 5th day of the disease on an average, but not until the 9th day with the Weil-Felix test. The actual findings were :—

Day of Disease	Percentage Positive	
	Rickettsia Agglutination	Weil-Felix
1-3	50	17
4-6	59	10
7-9	84	40
10-12	100	89

The rickettsia agglutination method therefore seems more reliable as a diagnostic method.

D. J. Bauer.

REITHMANN, E. Endemisches Fleckfieber im Mittelmeerraum. [Endemic Typhus in the Mediterranean Area.] *Beiträge z. Hyg. u. Epidemiol.* 1944, No. 2, 58 pp., 18 figs. [Numerous refs.]

This paper contains little that is new, but the author has prepared a concise summary of the literature dealing with the "endemic" fevers of the typhus group in the Mediterranean area up to about the year 1938.

The sections of the paper in which this information is supplied are entitled "Mediterranean tick typhus (boutonneuse fever)" and "endemic rat typhus (murine typhus)".

An extensive bibliography is appended, but it contains very few references to work published after 1936.

John W. D. Megaw.

NORVIIT, L. On the Electrocardiogram in Typhus Fever. *Acta Med. Scandinavica.* 1947, Mar. 3, v. 126, No. 6, 565-78, 4 figs. [47 refs.]

Electrocardiographic studies were carried out on 36 typhus patients. The most interesting results were obtained in the four fatal cases in which electrocardiograms were made one to four days before death, and the condition of the heart was examined after death.

The tracing was normal in one case in which there was extensive myocarditis; in the other three cases abnormalities were observed; in one of these the myocardium was normal, in another there was very slight myocarditis, and in the third there was a moderate degree of myocarditis.

The author concluded that extracardiac factors must have played important parts in causing electrocardiographic abnormalities.

In 80 per cent. of the 36 patients abnormalities were observed in the electrocardiograms; most of these were in connexion with the T wave and the S T segment.

A useful bibliography of 47 references is given.

John W. D. Megaw.

NORVIIT, L. On Auriculoventricular Conduction Disturbances in Typhus Fever. *Acta Med. Scandinavica.* 1947, Mar. 3, v. 126, No. 6, 579-88, 1 fig. [27 refs.]

This article is a supplement to the preceding one; it deals with nine cases in which the P Q interval was prolonged. The abnormality first appeared on the 12th to the 20th day of the illness, when the patients' general condition had

already improved. There was no evidence that the phenomenon was associated with any interruption in the patients' progress towards complete recovery.

John W. D. Megaw

SANTO Eine quantitative Schnellreaktionsmethode bei Fleckfieber [A Quantitative Rapid Test for Typhus Fever] *Ztschr f Immunitätsf u Exper Therap* 1943 Oct 25 v 103 No 6 494-508 1 fig

The author describes yet another rapid slide test for which he claims that within 12 minutes results can be obtained comparable with those of the standard Weil Felix reaction. The time needed does not include the separation of the serum. The only apparatus needed consists of hollow ground glass slides, a small pipette and a metal loop.

Six dilutions of the serum are made ranging from 1:3 by multiples of 5 to 1:9375. To each dilution a drop of *Proteus OX19* is added and readings are made after 3, 6 and 12 minutes. By taking into account the degree of agglutination, the time factor and the dilution it is claimed that reactions corresponding to Weil Felix titres of 1:200, 1:400 and so on up to 1:6400 can be observed.

A preliminary blitz test is also described by which negative sera can be eliminated within 20 seconds in this a single dilution of 1:5 is used.

Those interested will find details of the technique in the paper

John W. D. Megaw

VARLEY Florence V & **WEEDON** F R Further Study of the Quantitative Complement-Fixation Test as applied to the Serum Diagnosis of Typhus Fever *J Immunology* 1947 Feb v 55 No 2 189-92

The authors describe a further study of the application of the quantitative complement fixation test of Wadsworth *et al* see VARLEY & WEEDON this Bulletin 1946 v 43 210.

The antigens employed were prepared from eight strains of epidemic and four strains of murine typhus; the antisera were from guinea-pigs convalescent from

sera were sometimes higher when heterologous types of antigen were used than

Antisera	Antigens				
	Epidemic		Murine		
	Titres obtained				
	Colombia	Cairo	T68	Wild Rat	Wilmington
Epidemic (Colombia)	95-150*	200	16	—	150
Epidemic (Africa)	50-51	65-70	—	17	35-40
Murine (Wilmington)	31	43	25-32	6-75	160-190*

* Homologous antigen and anti-serum.

It will be noticed that if the Wilmington antiserum had been tested against the Wilmington and one of the epidemic antigens the reaction would have appeared to be type-specific, but the other results shown in the table are opposed to the view that the test can be relied on to differentiate between epidemic and murine typhus.

John W. D. Megaw.

PSHENICHNOV, A. V. & RAIKHER, B. I. *New Type of Vaccine from Typhus Lice.* *Amer. Rev. Soviet Med.* 1947, Feb., v. 4, No. 3, 231-7.

The authors describe an interesting modification of Weigl's method of preparing typhus vaccine from artificially infected lice.

Details of the method are not likely to be of interest except to a small number of workers, and these will prefer to consult the original article.

Brood lice reared in the laboratory were allowed to lay their eggs on human hairs; the young larvae were fed on a mixture of defibrinated blood and triturated bodies of infected lice; the mixture was kept in containers covered by epidermal membranes prepared from fresh human cadavers, and the larvae fed greedily through these membranes.

The engorged larvae were fed twice daily on immune human hosts until the 8th or 9th day, by which time they contained enormous numbers of rickettsiae and had reached the stage of transition to "Nymphs No. II". The nymphs were then allowed to feed on blood until they dropped off the feeding membrane. After starvation for 24 hours the lice and their faeces were ground up in a 0.2 per cent. solution of formalin; the resulting suspension, after further processing, constituted the vaccine.

The vaccine is claimed to be thoroughly effective; it is said to reduce the attack rate to 10 per cent. of that occurring among unprotected persons, and no fatalities have occurred among the vaccinated.

John W. D. Megaw.

BRUNEAU. *Infection naturelle du pou par le virus du typhus murin.* [Natural Infection of the Louse with Murine Typhus Virus.] Reprinted from *Rev. Méd. Française d'Extrême-Orient*. 1944, Mar., No. 3, 308-10, 2 figs.

BRUNEAU, J. & NGUYEN-DINH-DIEP. *Une épidémie de "Scrub Typhus" à Sonla.* [An Epidemic of Scrub Typhus in Sonla.] Reprinted from *Rev. Méd. Française d'Extrême-Orient*. 1942, Mar., No. 3, 293-301, 28 graphs & 1 plan.

In October 1941, an epidemic of scrub typhus occurred amongst the native garrison at Sonla, French Indochina. A total of 46 cases developed, with 11 deaths. Serological confirmation was made in 37 cases, the *Proteus* OXK agglutination titres varying from 1/300 to 1/5,000. Others were positive up to 1/100 only, except for a single patient who was serologically negative, and who died before further tests could be made.

Although the guard consisted of 139 Annamites and 90 Thais, the former alone were affected: serological tests of the Thai guards were all negative. The authors suggest that the adult Thais possessed an immunity from previous contact with the virus.

The epidemic, which occurred within a period of two months, was strictly

parasites were very numerous and active in the blockhouse.

H. J. O'D. Burke-Gaffney.

BUSTAMANTE M E & VARELA G III Estudios de fiebre manchada en Mexico Hallazgo del *Amblyomma cajennense* naturalmente infectado en Veracruz [Studies of Rocky Mountain Spotted Fever in Mexico] *Rev Inst Salubridad y Enfermedades Trop Mexico* 1946 June 1 7 No 2 75-8 1 map [10 refs] Summary in English by the authors]

Rocky Mountain Spotted Fever has in Mexico a wide geographical distribution from the Pacific Ocean to the Gulf of Mexico

The authors report the finding of *Amblyomma cajennense* naturally infected with Rocky Mountain Spotted Fever virus in the Municipality of Veracruz State of Veracruz Mexico

YELLOW FEVER

LEWIS, D J General Observations on Mosquitos in relation to Yellow Fever in the Anglo-Egyptian Sudan *Bull Entom Res* 1947 Mar 1 37, Pt 4 543-66 3 maps 39 refs]

This study of the mosquitoes of the Sudan is of great practical interest because most of the southern half is a yellow fever area and many important lines of communication by air rail and water pass through the country.

Of the 140 mosquitoes known to occur in the Sudan the author lists 66 common species under three headings (a) those that bite man readily (39 species) (b) those that are common in some areas but seldom or never bite man (18 species) and (c) those about which more information is needed (9 species)

Twelve species are known to be capable of transmitting the yellow fever virus by bite *Taeniorhynchus africanus* *Aedes aegypti* *A. aegypti* var *queenslandensis* *A. simpsoni* var *lilii* *A. metallicus* *A. africanus* *A. lenteocephalus* *A. vittatus* *A. stokesi* *A. taylori* *Eretmopodites chrysogaster* and *Culex fatigans* Two species are able to retain the virus throughout life but are apparently unable to transmit by bite—*Taeniorhynchus uniformis* and *Aedes lineatopennis* Two others are unable to retain the virus for more than a short time—*Anopheles gambiae* and *Aedes apicoargenteus* Notes are given on the habits of the adults of some of these species and their relation to yellow fever

An important part of the paper deals with the topography and mosquitoes of the country divided into faunal areas and discussed district by district for example the different reaches of the river Nile the Nuba mountains the Sadd and so on From the vast permanent and seasonal swamps known as the Sadd 63 species subspecies and varieties have been recorded The place swarms with mosquitoes and even in winter *T. africanus* and *T. uniformis* are so numerous that on one occasion a collector was able to catch on himself 758 in fifteen minutes

Representative catches have been made on steamers During one journey, in July 1945 929 mosquitoes were taken in seven days They included six species of *Anopheles* and fourteen culicines 78 per cent of the latter were *Culex antennatus* but says the author the 332 remaining on the steamer on the 10th July for instance were a mere remnant of the tens of thousands which had come aboard in clouds on the previous evening biting in all parts of the vessel

The potential vectors of yellow fever are controlled in the towns and villages situated along the lines of communication Trains steamers and aircraft are sprayed but in some places nothing short of abolishing river traffic altogether would prevent the transport of mosquitoes

Aedes aegypti is controlled as part of the normal work of the Public Health Department, but there is also an *Aedes* inspection unit in each province and one at headquarters which tours the whole country.

Mosquito control in the Sudan has brought about the following results: it has rendered impossible an urban epidemic of yellow fever due to *Aedes aegypti*; it has virtually exterminated *A. aegypti* from Khartoum; *A. aegypti* has not been reported in steamers for years; domestic mosquitoes in steamers have been greatly reduced in numbers. The author concludes that the chance of yellow fever spreading to the northward is very small. *H. S. Leeson.*

BAILEY, K. P. A Preliminary Note on the Sylvan Mosquitos of Gede. *East African Med. J.* 1947, Jan., v. 24, No. 1, 3S-41, 1 fig. & 2 pls.

Gede settlement is 65 miles north of Mombasa, 3 miles from the sea, and is surrounded by heavy bush and forest. Since 1941, weekly collections have been made of larvae of mosquitoes from tree-holes and bamboo pots, and of adults from the bush. Since 1945, collections have been made from tree platforms at heights of 30 and 36 feet. In November 1946, simultaneous catches were made on tree platforms, at the base of a tree and in bush outside the forest. The study was made with special reference to yellow fever.

Brief notes are given on the habits of some of the species; those with marked acrodendrophily, i.e. which haunt the upper forest strata, are *Aedes (Diceromyia) adersi*, *taylori* and *furcifer*. One of these or all three may be the jungle vectors of yellow fever at Gede. *H. S. Leeson.*

PERLOWAGORA, Alina & HUGHES, T. P. The Complement Fixation Test in Yellow Fever Epidemiology. The Use of Globulin Antigen in Immunity Surveys. *J. Immunology.* 1947, Feb., v. 55, No. 2, 103-19. [16 refs.]

In former years attempts to devise a satisfactory complement-fixation test for yellow fever had been unsuccessful. Recently LENNETTE and PERLOWAGORA [this *Bulletin*, 1944, v. 41, 211] achieved considerable success with a mouse-brain antigen, but this produced a rather high percentage of non-specific positive reactions with sera which also gave a positive Wassermann reaction. The authors have extracted the globulin fraction from this antigen and found that it is more sensitive and . . . of non-specific reactions with human sera. As a rule, . . .

in yellow fever and are usually detectable . . . fixation was only considered specific when neutralizing antibodies . . . demonstrable. In the cases studied by the authors, the neutralizing antibodies appeared by the 5th to 7th day, but the complement-fixing antibodies not until about the 14th day and in some cases not until after the 20th day.

Though detailed tests which will indicate the duration of complement-fixing antibodies to yellow fever are as yet incomplete, the antibodies appeared to persist at least 130 days after the onset of disease. Although the complement-fixing antibody is formed after mild inapparent infections as well as after the more severe infections seen in epidemics, it is seldom formed after the inapparent infection produced by the injection of vaccine made from the 17D attenuated strain of yellow fever virus.

The complement-fixation test for yellow fever virus using this new antigen, should prove a useful and simple test for tracing comparatively recent cases of yellow fever in epidemiological studies. *F. O. MacCallum.*

BRITISH GUIANA Yellow Fever Service. Medical Department. Semi-Annual Report January-June, 1946 [DE CAIRES P F Chief Officer] 9 mimeographed pp

This report covers the period January-June 1946 the routine anti *Aedes* control measures previously described [see this *Bulletin* 1946 v 43 1136] have been continued with considerable success for instance in Georgetown in spite of heavy rainfall in April-June the *Aedes aegypti* house index (for adults pupae or larvae) fell from 2.19 per cent at the end of 1945 to 0.32 per cent at the end of June 1946. Experiments with DDT are being continued and at Plaisance a single spraying of houses with 5 per cent DDT in kero-ene was found to be effective for 10 months. The optimum period for spraying is not yet known however and it is recognized that eggs may remain viable in roof gutters and elsewhere for several months and may hatch when rain falls and that these adults may appear after DDT from the last spraying has lost its efficacy. Evidently there is need for much more investigation but the author of this report thinks that DDT is one of the very important means for control of *Aedes aegypti* as of the mosquitoes concerned in malaria and filariasis in British Guiana. It is now proposed to spray large areas carrying a population of 30,000 on each side of the Demerara River estuary.

No cases of yellow fever were found during the period two new viscerotomy posts have been created vaccination is still carried out in Georgetown. A bonus system for efficient work has been most successful for zone inspectors.

Charles W. Wilcocks

PLAGUE

GRENOUILLEAU G. Notes on the Plague in Algeria. *Bull. Office Internat. d'Hyg. Publique*, 1946 July-Aug-Sept v 37 Nos 7-8-9 432-44 [French version 419-31]

The state of political and economic conditions have made the epidemic spread of plague increasingly difficult. It may also be said now that with prompt diagnosis and effective therapy plague should be a reality of the past rather than danger to the future. Small and rare epidemics do however still occur and by their very rarity afford an opportunity for study of the mode of transmission. The author has studied two such epidemics. The first spread from a patient to 7 members of his family in succession and then either to relations or to visitors making a total of 180 cases with 97 deaths. The other started as a murine epizootic and affected sixty persons with bubonic plague who were domiciled in different places and had no contact with one another. The first epidemic was not pneumonic not a case of droplet infection nor were any rats to be found alive or dead to account for the onset and continuation of the outbreak. This epidemic then has led the author to argue in favour of the transmission of bubonic and septicæmic plague from man to man by the human flea *Pulex irritans*. This view receives its support also from the experiments of BLANC and the contentions put forward by RICARDO JORGE. The second epidemic was of the ordinary type and the insect vector was probably the rat flea *Xenopsylla cheopis*.

Plague.

Vol. 44. No. 7.]

Acceptance of the view of transmissibility of plague, on occasion, from man to man by human ectoparasites is easier for anyone who has really seen the extraordinary degree which such parasitism may attain in Algeria. Prophylactic action on this basis is set out clearly in the article and may be given in very abbreviated forms:—(1) Prompt detection and isolation of all suspected cases, including all cases "where the patient has a temperature and presents an adenopathy of unknown cause". (2) "Disinsection of all suspected cases and their contacts, of their belongings, and of their homes and the places where they work". (3) Daily medical supervision of all suspected cases.

The other plague measures recommended follow the usual lines.
W. F. Harvey.

K. KNIGSFELD, E. G. H. & NAMBIAR, K. P. S. Plague-Meningitis. *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 474-5.
Report of 2 cases.

ALBERTO VIDELA, C. Clínica y tratamiento de la peste. [Treatment of Plague.] *Día Médico.* 1947, Jan. 6, v. 19, No. 1, 1-4, 6.

In plague, chemotherapeutic substances are under test. Sulphonamides, still the mainstay of treatment, have passed their trials satisfactorily; penicillin has apparently been rejected. Streptomycin is a newcomer which has to be proved for both efficacy and safety. In this article, there is a general review of treatment but the dissertation relates especially to five cases of plague which recovered completely under treatment. Two of these were young, a boy of 14 years and a girl of 16 years: the others were adults. Their treatment was varied and comprehensive: they were serious cases of septicaemic plague and one even of plague meningitis, while only one was bubonic. On admission, patients with cardiovascular collapse and hypotension were given immediately an adreno-cortical preparation (10 mgm. 3-hourly up to 30 mgm.) and anti plague serum (100 cc. intramuscularly in adults, 70 cc. in children for 3 days, [intervals not stated]). Sulphonamide treatment in high dosage, and apparently without sign of renal complication, was begun early, and as auxiliary to this—possibly a factor concerned in the absence of therapeutic complication—there were given (1) sodium citrate and sodium bicarbonate in water, for thirst, (2) vitamin C and vitamin B. Penicillin was used where pulmonary complication due to secondary infection was feared. The availability, however, of streptomycin afforded an opportunity for its trial in these patients who, in spite of the treatment already used, gave cause for anxiety.

The young girl, a very serious case, received a total of 15 gm. streptomycin intramuscularly in serial daily doses (½ gm. every 3 or 4 hours) of 4, 3, 3, 2, 2 and 1 gm., amounting in total to 15 gm. One of the least complicated adult cases received a total of 9.5 gm. The second child, a boy, in whom cisternal puncture revealed meningitis, had some of his streptomycin administered by this route with surprising effect; the purulent cerebrospinal fluid rapidly cleared and the meningeal symptoms subsided.

As the author says, five cases, and those rather complicated, do not suffice to establish the value of any drug; but they do hold out hope for streptomycin. Much work, however, still remains to be done on streptomycin.

W. F. Harvey.

GORDON, J. E. & KNIES, P. T. Flea versus Rat Control in Human Plague. *Am. J. Med. Sci.* 1947, Mar., v. 213, No. 3, 362-76. [26 refs.]
A useful review of recent knowledge and experience.

CHOLERA

GALLUT J. Recherches sur le potentiel d'oxydoreduction du vibron cholérique [The Oxido-Reduction Potential of the Cholera Vibrio.] *Ann Inst Pasteur* 1947, Feb. v. 73 No. 2 154-68 5 figs [12 refs]

Physical methods have been less used than chemical in the specific differentiation of bacteria. Only one work is known to the author which applies potentiometric methods to the true cholera vibrio, that of SEAL and MITRA [this *Bulletin* 1939 v. 36 897]. Gallut has undertaken, for this organism the systematic study of the potential of oxido-reduction in different media and under different conditions of culture. The data are expressed in terms of E_h , a measure of the oxidation reduction potential of the organism referred to the normal hydrogen electrode which "is obtained by the algebraic sum of the potential of the calomel electrode ($E = -0.236$ at 37°) and the measured potential (E_{me}), which can be positive or negative. His results, briefly summarized, show that the cholera vibrio cultivated aerobically, impresses on the medium a negative potential attaining spontaneously values as low as -200 millivolts. The vibrio is not to be regarded as a strict anaerobe, however, but as a facultative anaerobe. In different media, ordinary or synthetic and without glucose, the E_h minimum (maximum of reduction) is attained in about 40 hours, remains at this level for some hours and then rises gradually in from 10 to 40 days, during which time the medium is exhausted and the organisms die. Under anaerobic conditions maintained under vaseline after reconstitution and the addition of reducing agent, the vibrio shows its capacity for developing at the very low potential of -450 mv. that is to say a potential

It is possible to prevent the reduction corresponding to the logarithmic phase of proliferation of the vibrio by vigorous bubbling of air through the medium when the oxido-reduction potential can be maintained constant at about 100 mv. even in glucose media. In such case the glucose is oxidized and not fermented.

W. F. Harvey

BRUNEAU J. Note sur un vibron paracholérique [A Paracholera Vibrio] Reprinted from *Revue Méd. Française d'Extrême-Orient* 1943 Nos. 4-5-6, 564-5.

The author in 1943 isolated a vibrio from a patient in Ninh Binh, Tonking who was suffering from typical but non fatal cholera.

The vibrio corresponded closely to the cholera vibrio in its morphological, cultural and biochemical characteristics, but failed to give specific agglutination reactions with classical anti-cholera sera. It was insensitive to anti-cholera

tinable
cholera

The epidemiological significance of these "paracholera" vibrios is discussed.
H. J. O. D. Burke-Gaffney

BACILLARY DYSENTERY.

HUNTER, J. K. An Epidemic of Bacillary Dysentery in Kigezi District, Uganda. *East African Med. J.* 1947, Feb., v. 24, No. 2, 98-105.

This is an account of an outbreak of dysentery which appeared in the Kigezi District, Uganda, in October 1944. In the administrative sub-section mostly affected (population 18,000) deaths ascribed to dysentery during that month were 308, compared with the usual monthly average of 26. Two thousand and sixty-nine cases came under observation. Only a few specimens could be sent for bacteriological examination, but *Sh. shigae*, the only pathogen isolated, was probably the cause of the epidemic.

Shortage of food doubtless rendered this population particularly liable to infection; the main vehicle of spread is believed to have been water. Owing to the highly permeable volcanic soil, springs are very rare and rain water, after coursing over the highly contaminated ground, is gathered in collecting pits at the lower end of the compounds. Another probable factor was eating from a communal dish with unwashed hands.

Treatment of the sick and control of the epidemic presented difficult problems. Camps were opened at a number of places, and details of the construction and staffing of these and of the diet and nursing of the patients are described. The death rate in untreated cases was believed to be 55-60 per cent. but this was much reduced by treatment. Comparative figures show that, by treatment which included the use of the sulphonamide drugs, the rate was reduced to about 3-5 per cent.

Sanitary measures comprised the abolition of surface collecting pits, the construction of latrine trenches in each compound, protection of springs, chlorination of water-holes and construction of rain catchments and tanks in the waterless areas. The epidemic came to an end in the early months of 1945.

J. C. Cruickshank.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

PICK, F. La longévité de l'amibe dysentérique sur le milieu à l'insuline. [Longevity of Dysenteric Amoebae in an Insulin Medium.] *C. R. Soc. Biol.* 1946, May, v. 140, Nos. 9/10, 238-9.

In a previous abstract [this *Bulletin*, 1947, v. 44, 582] reference was made to the author's experience with an insulin medium for the cultivation of dysenteric amoebae.

In the present paper, he has compared the longevity of amoebae in insulin medium with that in the classical medium of Dobell and Brumpt from which ordinarily subculture is required every 5 to 7 days. Four series of experiments were made, in which subculture was carried out every 1, 2, 3 and 4 weeks respectively, together with control experiments on media from which insulin was omitted.

A culture of amoebae, deliberately chosen during a period of weakened growth, was employed in the tests.

With subculture every 21 days it was possible to maintain the culture for 10 weeks in the insulin medium, whereas the amoebae died out in media not containing insulin.

It is concluded that regular subculture of amoebae in insulin medium may safely be made every 14 days, instead of every 5 to 7.

H. J. O'D. Burke-Gaffney.

KEEN, P. Surgical Amoebiasis of the Liver. *South African Med J* 1947, Feb 22, v 21, No 4, 114-19, 8 figs

Open drainage of an amoebic liver abscess is undesirable, and aspiration possibly repeated is generally regarded as curative in most cases of the condition. This has not been the author's experience. Considering the cases at the von European Hospital, Johannesburg, during the last few years the author finds that the over all mortality rate has been 'well over 50 per cent' (several cases were only diagnosed at autopsy), the main cause of death was secondary infection of the abscess cavity. Many patients arrived moribund, treatment having been unduly delayed, lung complications were common, insufficient attention was devoted to general management and nursing, and too much reliance was placed on the allegedly specific treatment of the amoebiasis.

An account is given of the treatment of three more recent cases of amoebiasis of the liver with extensive abscess formation, in Africans. The site, size and shape of the abscesses were determined by radiographs of the patients in various positions. In the first two cases drainage was repeated.

In the third case drainage was not repeated, but a result of good result of drainage and effectively prevented secondary bacterial infection. Blood transfusions were done, 500 cc of blood being given weekly, additional quantities were given when falls in the haemoglobin level indicated the need.

A R D Adams

DACK, S & MOLOSHOK, R E. Cardiac Manifestations of Toxic Action of Emetine Hydrochloride in Amebic Dysentery. *Arch Intern Med* 1947, Feb, v 79, No 2, 223-38, 4 figs

muscular and gastro-intestinal signs preceded the toxic cardiac signs, and are an indication for the suspension of the drug. To minimize the risk of poisoning the following rules should be observed: patients under emetine therapy should be confined to bed; the pulse rate should be recorded at frequent intervals, tachycardia being an early sign of toxicity; diarrhoea, fatigue, dyspnoea on exertion, muscular tremors and dizziness should be watched for; an electrocardiogram should be taken before treatment and after the fifth gram of dosage; emetine should not be given unnecessarily, 5 to 7 grains

A R D Adams.

QUÉRANGAL DES ESSARTS J SOUBIGOU A & AUTHEMAN Note sur trois cas de coccidiose humaine observés à Toulon dont un cas autochtone [Three Human Cases of Coccidiosis in Toulon, including One Autochthonous Case] *Bull Soc Path Exot* 1946 39 Nos 11 12 418-22

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SABALETTE R DOMINGUEZ M & IGLESIAS R. Estudio clinico hematologico y terapeutico de un brote de fiebre recurrente [Study of an Outbreak of Relapsing Fever; Clinical, Haematological, and Therapeutical] *Med Colonial Madrid* 1947 Mar 1 9 No 3 207-21 [39 refs]

The outbreak referred to occurred in Seville in the summer of 1946 and some 30 cases were systematically studied. In addition to clinical observations the peripheral blood the sternal marrow and in those with neurological manifestations the cerebro spinal fluid were examined. The louse was probably the vector.

Clinical—The incubation period ranged between 5 and 10 days. The onset was abrupt with headache and shivering and, in half the cases, vomiting, sometimes repeated and severe. The fever with slight morning remissions, was maintained for 3-7 days and then fell abruptly, perhaps to 36°C, rarely a more gradual drop extending over 48 hours was seen. The patients felt at once without any of the pre-critical or critical disturbances noted by others. The apyrexial interval might last up to 8 days when, in three patients, a second attack set in. None had a third attack. In those with intense headache the spinal fluid was under increased pressure but was clear. One patient had profuse diarrhoea of a dysenteric character and one had an enlarged spleen. Seventy five per cent (22 or 23 of the 30) complained of pain in the calves which might be very severe and persisted throughout the illness.

Haematological—All showed some degree of hypochromic anaemia, red cells had 16,000 to 17,000 per cmm. Haemoglobin ranged between 48 and 77 per cent. The reduction in eosinophiles was notable in 26 none was seen one had 2 per cent and three had 1 per cent. A marked feature was the large proportion of immature leucocytes promyelocytes myelocytes and metamyelocytes. Spirochaetes were very numerous present in every field during the fever. They were likewise common in the marrow smears and in three after subsidence of the fever, others showed rounded or fragmenting spirochaetes.

Therapy—The authors obtained excellent results from slow intravenous

- LEBOZ " " " Traitement de la fièvre récurrente cosmopolite.
Relapsing Fever.] *Cahiers Médicaux de*
Paris. 2, No. 6, 5-12. [14 refs.]

- SHAUL, J. F. & SAFERSTEIN, T. H. Penicillin Therapy in Relapsing Fever. Report of Four Cases. *U.S. Nav. Med. Bull.* 1947, Mar.-Apr., v. 47, No. 2, 238-43.

- FLOCH, H. & GRIMALDI, J. T. Cinq autres observations de leptospirose ictéro-hémorragique en Guyane Française. [Five Further Cases of *L. icterohaemorrhagiae* Infection in French Guiana.] Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 141. 1946, Nov., 4 pp.

The authors report five cases of leptospirosis due to *L. icterohaemorrhagiae*, diagnosed in French Guiana, and refer to eight others previously recorded. They claim that this disease is evidently fairly common in that country, and that it is important, not only in itself, but also because it so closely resembles yellow fever. Details of the cases are given. Charles Wilcocks.

- SHIH LU CHANG. Studies on *Leptospira icterohaemorrhagiae*. II. A Critical Study of the Effect of Penicillin on *Leptospira icterohaemorrhagiae* in vitro and in Leptospirosis in Guinea-pigs. *J. Clin. Investigation*, 1946, Sept., v. 25, No. 5, 752-60. [12 refs.]

Penicillin *in vitro* arrested the multiplication of *Leptospira icterohaemorrhagiae* in doses of 0.4 O.u. per cc. upwards, but even in concentrations of 5,000 O.u. per cc. showed no leptospiricidal effect. The organisms disappeared from the blood of infected guineapigs 3 to 5 days after injection of penicillin, when daily dosages of about 800 O.u. and a serum level of more than 0.2 O.u. per cc. were maintained. The leptospirae remained in the liver, however, even when the dose was increased to 3,000 O.u. daily, and 6 to 8 days after the blood had become negative.

Some of these treated guineapigs relapsed several days after the last dose of penicillin but usually recovered spontaneously. This is attributed to the partial immunity developed in response to the large number of organisms inoculated, and agglutination tests showed that antibodies were present. Penicillin seemed to have some therapeutic effect in infected guineapigs if the treatment was introduced before the appearance of jaundice; after this had developed, no beneficial effects were observed.

On the basis of these observations, the author estimates that a daily dose of 250,000 to 300,000 O.u. is necessary in human cases of the disease; and is of the opinion that the results with guineapigs should not discourage the use of penicillin in human beings suffering from leptospirosis, in whom it is not such a serious infection as in young guineapigs.

E. Hindle.

- DEL SEL, M. & GIBERTI, C. Enfermedad de Weil. Sobre un caso de *Leptospira canicola*. [A Case of *Leptospira canicola* Infection.] Rev. Asoc. Med. Argentina. 1947, Jan.-Feb., v. 61, Nos. 597/600, 37-8.

- ALICATA, J. E. Leptospiral Infection among Rodents in Micronesia. *Science*. 1947. Feb. 28. 236. 1 fig.

Little is known of the incidence of murine leptospirosis in the Pacific Islands. The author previously showed [this *Bulletin*, 1944, v. 41, 578] that it occurs in the Hawaiian Islands, and therefore a preliminary survey was made by him in July-August 1946, under the auspices of the University of Hawaii Pacific

Islands Research Committee to investigate the matter further this survey includes a study of two islands of the eastern Carolines namely Moen of Truk Atoll and Ponape

On Moen three of 22 rats and on Ponape two of 18 rats examined had leptospirae in the urinary tubules This finding is illustrated in two microphotographs

The author states that as far as he knows this is the first record of murine leptospirosis in any Micronesian islands and that it supports the view that Weil's disease in man is at present

be more common in Micronesia
and large rodent population are
H J O D Burke-Gaffney

GARNHAM P C C A New Blood Spirochaete in the Grivet Monkey, *Cercopithecus aethiops* East African Med J 1947 Jan v 24 No 1 47-51

The author found a spirochaete in the blood of a grivet monkey *Cercopithecus aethiops centralis* in the forest of southern Mau Kenya Colony at an altitude of 6,500 feet

Morphologically the spirochaete resembled those of relapsing fever stained specimens averaged 17μ in length and by dark ground examination it was noted that the ends appeared pointed and that the coils averaged eight in number

White mice white rats and monkeys were susceptible to infection but guinea pigs and rabbits were not In white mice the infection resembled that of *Treponema pallidum* in man with irregular relapses *neurotropism* appeared in one mouse after 3 months infection the strain has been maintained in mice where it has reached the 92nd passage some increased virulence occurred

Transmission experiments with lice (*Polypus serrat* and *Pediculus humanus*) and ticks (*O. morsus*) failed to reproduce infection in animals

Earlier records of spirochaetes found in African primates are shown in a table in the text The author believes that this is the first record of a natural spirochaetal infection in East African monkeys He points out the consequent need for care in using such animals in experimental work and the desirability of checking laboratory infections in them by means of cross immunity tests in order to exclude anomalous simian strains

It is proposed to name this organism *Spirochaeta harveyi* in honour of Mr A E C Harvey

H J O D Burke-Gaffney

HELMINTHIASIS

J LAIN BOMBAY 1946 Nov v 15 Pt 3 31-41 Synthetical Anthelmintics
Part XI γ -4-Alkoxy-3-Tolyl Butyrolactones (BHATT B L & NARGUND H S)
Part XII γ -4-Alkoxy-2-Tolyl Butyrolactones & Part XIII γ -2-Alkoxy-5-Tolyl Butyrolactones (PATEL, N Z & NARGUND H S)

THURET C & THIBAUT C L'oxygène peut-il être utilisé comme vermifuge ? [Can Oxygen be used as a Vermifuge ?] C R Soc Biol 1946 Feb v 140 Nos 3 & 4 89-91

The antihelminthic action was marked only when produced in a form toxic to hosts

STOLL, N. R. This Wormy World. With Addendum. *J. Parasitology*. 1947, Feb., v. 33, No. 1, 1-18.

A valuable study, with extensive references, of the probable incidence of the different forms of helminthiasis throughout the world. The complications of the problem are discussed. This detailed paper should be read in the original.

H. J. O'D. Burke-Gaffney.

NAGATY, H. F. The Incidence of Parasitic Infections among the Labourers of Ras Gharib, Red Sea District. *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 14-21.

Twenty-three per cent. of 111 persons harboured internal parasites of which *Schistosoma* and *Ancylostoma* constituted 6 and 5 per cent.

BUEDING, E., PETERS, L. & WAITE, Jean F. Effect of 2-Methyl-1,4-Naphthoquinone on Glycolysis of *Schistosoma mansoni*. *Proc. Soc. Exper. Biol. & Med.* 1947, Jan., v. 64, No. 1, 111-13.

"2-Methyl-1,4-naphthoquinone markedly inhibits aerobic glycolysis of *Schistosoma mansoni* *in vitro*. Since glycolysis, rather than oxidative metabolism, appears to be essential for the survival of these organisms, and since the toxicity of 2-methyl-1,4-naphthoquinone for mammalian species is low, the effect of this compound in experimental schistosomiasis has been studied. Results in mice suggest that the compound may act synergistically with subcurative doses of antimonials ('Fuadin')." "

BRANDT, J. L. An Operative Approach to the Treatment of Schistosomiasis mansoni Infections. *Science*. 1947, Feb. 28, 239-40.

The author refers to his previous preliminary work with FINCH (*Proc. Soc. Exper. Biol. & Med.*, 1946, v. 61, 22) in which adult *S. mansoni* could be removed more easily and in greater numbers from the portal veins of experimentally infected animals which had been heparinized than from those which had not. Many adult worms were recovered from the livers of the heparinized animals: the portal vein of a heparinized rabbit could be aspirated while keeping the rabbit alive.

As a result of this experience, the author studied this procedure as a therapeutic measure. Five rabbits and two monkeys, infected with *S. mansoni*, were subjected to portal vein aspiration under anaesthesia.

It was found possible to aspirate the portal vein of a heparinized monkey and keep the animal alive: the monkeys used showed infections closely simulating *S. mansoni* infections in man, and the lighter this infection, the greater was the number of adult worms recovered.

It is suggested that if heparin can mobilize and localize adult worms in the portal vein and liver, it may be possible to use heparin systematically, thereafter introducing anthelmintics directly into the portal vein: this would tend to produce a large concentration of the drug used in a position where its greatest effect could be exerted.

H. J. O'D. Burke-Gaffney.

HALAWANI, A. On the Effect of the Delta Isomer of Benzene Hexachloride (Deltaxane) on the Snails *Bulinus* and *Planorbis*. *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 35-41.

Deltaxane is claimed to be effective against *Bulinus* and *Planorbis* in a dilution of 5 parts per million. [See this *Bulletin*, 1947, v. 44, 331.]

Islands Research Committee to investigate the matter further. This survey includes a study of two islands of the eastern Carolines, namely, Moen of Truk Atoll and Ponape.

On Moen three of 22 rats and on Ponape two of 18 rats examined had leptospires in the urinary tubules. This finding is illustrated in two microphotographs.

The author states that as far as he knows this is the first record of murine leptospirosis in any Micronesian islands and that it supports the view that Weil's disease in man is also present.

It is suggested that human leptospirosis may be more common in Micronesia than has been believed. The high rainfall and large rodent population are highly favourable to the spread of the disease. H. J. O. D. Burke-Gaffney.

GANNHAM, P. C. C. A New Blood Spirochaete in the Grivet Monkey, *Cercopithecus aethiops*. *East African Med. J.* 1947 Jan. v 24 No 1 47-51.

The author found a spirochaete in the blood of a grivet monkey *Cercopithecus aethiops* in the forest of southern Mau Kerva Colony at an altitude of 6,000 feet.

Morphologically the spirochaete resembled those of relapsing fever. Stained specimens averaged 17 μ in length and by dark ground examination it was noted that the ends appeared pointed and that the coils averaged eight in number.

White mice, white rats and monkeys were susceptible to infection but guinea pigs and rabbits were not. In white mice the infection resembled that of *Treponema* in man with irregular relapses. Neurotropism appeared in one mouse after 3 months infection; the strain has been maintained in mice where it has reached the 92nd passage. Some increased virulence occurred after about the tenth passage.

Cross immunity tests against two East African strains of *Treponema* and an Arabian strain of *Treponema recurrentis* were negative.

A man was inoculated with infected mouse blood and spirochaetes appeared in his blood for one day on the 19th day without febrile reaction.

Transmission experiments with lice (*Phthirus serratus* and *Pediculus humanus*) and ticks (*O. muris*) failed to reproduce infection in animals.

Earlier records of spirochaetes found in African primates are shown in a table in the text. The author believes that this is the first record of a natural spirochaetal infection in East African monkeys. He points out the consequent need for care in using such animals in experimental work and the desirability of checking laboratory infections in them by means of cross immunity tests in order to exclude anomalous simian strains.

It is proposed to name this organism *Spirochaeta harveyi* in honour of Mr A. E. C. Harvey. H. J. O. D. Burke-Gaffney.

HELMINTHIASIS

- J. L. N. B. M. B. 1946 Nov. v 15 P. 3 31-41. Synthetical Anthelmintics
Part XI γ -4-Alkoxy-3-Tolyl Butyrolactones (BHATT B. L. & NARGUND K. S.)
Part XII γ -4-Alkoxy-2-Tolyl Butyrolactones & Part XIII γ -2-Alkoxy-5-Tolyl Butyrolactones. PATEL, N. Z. & NARGUND K. S.

THURLEY, C. & THIRACLY, C. L'oxygène peut-il être utilisé comme vermifuge? Can Oxygen be used as a Vermifuge? *C. R. Soc. Biol.* 1946 Feb. v 140 Nos 3 & 4 84-91.

The anthelmintic action was marked only when produced in a form toxic to the host.

STOLL, N. R. This Wormy World. With Addendum. *J. Parasitology*. 1947, Feb., v. 33, No. 1, 1-18.

A valuable study, with extensive references, of the probable incidence of the different forms of helminthiasis throughout the world. The complications of the problem are discussed. This detailed paper should be read in the original.

H. J. O'D. Burke-Gaffney.

NAGATY, H. F. The locleoce of Parasitic Infections among the Labourers of Ras Gharb, Red Sea District. *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 14-21.

Twenty-three per cent. of 111 persons harboured internal parasites of which *Schistosoma* and *Ancylostoma* constituted 6 and 5 per cent.

BUEDING, E., PETERS, L. & WAITE, Jean F. Effect of 2-Methyl-1,4-Naphtboquinone on Glycolysis of *Schistosoma mansoni*. *Proc. Soc. Exper. Biol. & Med.* 1947, Jan., v. 64, No. 1, 111-13.

"2-Methyl-1,4-naphtboquinone markedly inhibits aerobic glycolysis of *Schistosoma mansoni* *in vitro*. Since glycolysis, rather than oxidative metabolism, appears to be essential for the survival of these organisms, and since the toxicity of 2-methyl-1,4-naphtboquinone for mammalian species is low, the effect of this compound in experimental schistosomiasis has been studied. Results in mice suggest that the compound may act synergistically with subcurative doses of antimonials ('Fuadin')."

BRANDT, J. L. An Operative Approach to the Treatment of *Schistosomiasis mansoni* Infections. *Science*. 1947, Feb. 28, 239-40.

The author refers to his previous preliminary work with FINCH (*Proc. Soc. Exper. Biol. & Med.*, 1946, v. 61, 22) in which adult *S. mansoni* could be removed more easily and in greater numbers from the portal veins of experimentally infected animals which had been heparinized than from those which had not. Many adult worms were recovered from the livers of the heparinized animals: the portal vein of a heparinized rabbit could be aspirated while keeping the rabbit alive.

As a result of this experience, the author studied this procedure as a therapeutic measure. Five rabbits and two monkeys, infected with *S. mansoni*, were subjected to portal vein aspiration under anaesthesia.

It was found possible to aspirate the portal vein of a heparinized monkey and keep the animal alive: the monkeys used showed infections closely simulating *S. mansoni* infections in man, and the lighter this infection, the greater was the number of adult worms recovered.

It is suggested that if heparin can mobilize and localize adult worms in the portal vein and liver, it may be possible to use heparin systematically, thereafter introducing anthelmintics directly into the portal vein: this would tend to produce a large concentration of the drug used in a position where its greatest effect could be exerted.

H. J. O'D. Burke-Gaffney.

HALAWANI, A. On the Effect of the Delta Isomer of Benzene Hexachloride (Deltaxane) on the Snails *Bulinus* and *Planorbis*. *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 35-41.

Deltaxane is claimed to be effective against *Bulinus* and *Planorbis* in a dilution of 5 parts per million. [See this *Bulletin*, 1947, v. 44, 331.]

DE OLIVEIRA H L & MEIRA J A. Sobre um caso de infecção humana pelo *Clonorchis sinensis* considerações a respeito da técnica de exame da bile para o diagnóstico dessa parasitose [A Case of Human Infection with *Clonorchis sinensis* Diagnosis by Bile Examination] *Hospital* Rio de Janeiro 1946 Oct v 30 No 4 559-77 4 figs [20 refs] English summary

A young man of Portuguese descent who was born in Shanghai was under the care of the authors in São Paulo Brazil. He complained of diarrhoea, epigastric pain and anorexia of two years standing and loss of weight for six weeks.

Investigation of the bile obtained through duodenal drainage revealed the presence of eggs of *Clonorchis sinensis*. These were not detected in the stools until repeated examinations were made. The eggs persisted in the bile after a month's treatment with gentian violet although there was some clinical improvement.

The authors emphasize the value of bile examination as a means of early diagnosis and describe the technique employed. They also discuss the clinical and pathological aspects of the disease and the need for keeping a watch for it especially with the use of bile examination among Oriental immigrants in Brazil.

H J O D Burke Gaffney

NASR M. The Occurrence of *Prohemistomum vitax* (Sensino, 1892) Azim, 1933 Infection in Man with a Redescription of the Parasite. Reprinted from *Lab & Med Progress* 1941 Nov v 2 No 2 135-49 5 figs [38 refs]

ARSH J F Jr. The Relationship in Mice of Intestinal Emptying Time and Natural Resistance to *Hymenolepis*. *J Parasitology* 1947 Feb v 33 No 1 79-84

KAMALOV N G. On Infection of Human Beings by Ancylostomidae through Grass. *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 3 68-72 [In Russian]

The author carried out an investigation on the method of infection with hookworms in an endemic area of Georgia. It was observed that in certain localities the infection could be acquired by persons who had never been in contact with the bare earth and the suspicion arose that the infection might be acquired from grass. Various samples of soil and grass were accordingly examined for the presence of larvae and experiments were carried out under laboratory conditions. The results are summarized as follows: (1) Soil covered with grass is more favourable to the development and prolonged maintenance of the infective hookworm larvae than bare earth. (2) Grass even at a temperature unsuitable to the development of the larvae remains infective for up to 10 days. (3) Larvae of grass up to 10 days old are infective only under conditions of high humidity. (4) Larvae take place only in the soil and not in the air. (5) Larvae die in contact with water. (6) Larvae die even when the temperature is 20°C. (7) Larvae were demonstrated to be active when removed from grass actively penetrate through moist socks and invade the skin.

C A Hoare

MOLINA, R. D. & SANTOS, H. A. Tetrachlorethylene Treatment of Ankylostomiasis. *J. Philippine Med. Ass.* 1946, Sept., v. 22, No. 9, 385-7. [13 refs.]

"Of 32 patients treated 29 were cured. Practically no untoward effects were noted."

VON BRAND, T. & SIMPSON, W. F. Physiological Observations upon a Larval *Eustrongylides*. X. The Lethal Mechanism of Bacteria. *J. Parasitology*. 1947, Feb., v. 33, No. 1, 71-8. [10 refs.]

FAROOQ, M. & QUTUBUDDIN, M. Epidemiology of Filariasis in certain Parts of H.E.H. the Nizam's State. *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 470-74, 1 map.

A preliminary survey had shown that filariasis was endemic in Hyderabad State in a kidney-shaped area in the centre of the north-east quarter of the State. The present survey was carried out in a small roughly circular area with a radius of 15 miles and its centre at Kamareddy, at the pelvis of the kidney. Twenty-four villages, with a total population of 43,593, were surveyed. A house-to-house search was made for persons with clinical evidence of filariasis, and random samples of blood were taken between 9 p.m. and 3 a.m. to determine the infestation rate in apparently healthy persons. (In the results which follow, percentages are shown in brackets.)

In 692 persons (1.62 per cent.) filarial disease was found. in 615 of them (88) hands only; in 35 (1.0) the scrotum. The sexes were equally affected. The highest incidence was in the 46-50 age group: the youngest patient with lymphangitis was 7 years old and with elephantiasis 8 years.

Samples of night blood were taken from 138 persons of the filarial disease group and in only one were microfilariae found. Among 584 persons without clinical evidence of filariasis, 91 (15.5 per cent.) were found infested.

The infestation rates were estimated roughly; they varied from 27 to 447 microfilariae per drop of blood.

The microfilariae were identified as belonging to the species *Wuchereria bancrofti* in 92.4 per cent. of cases and *W. malayi* in 7.6 per cent.

Culex fatigans was the only proven vector. *Mansonia* (*Mansonioides*) *uniformis* and *M. (M.) indiana* were found to be breeding in the vicinity, but none was found in the human dwellings.

A rational formula for expressing the degree of endemicity, which takes into account microfilarial infestation and filarial disease, was suggested.

L. E. Napier.

BOZICEVICH, J., DONOVAN, A., MAZZOTTI, L., DIAZ, A. F. & PADILLA, E. Intradermal and Complement Fixation Reactions elicited by various Antigens in Persons Infected with *Onchocerca volvulus*. *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 51-62.

The work here recorded continues that of WRIGHT and MURDOCK [this *Bulletin*, 1944, v. 41, 1054], which included a review of the literature. The present authors point out that most earlier workers on this subject have arbitrarily selected certain antigen dilutions and have not done quantitative antigen titrations to screen out non-specific reactions due to toxicity of the material or to the influence of parasitic infections other than *O. volvulus*. They set out to investigate this question and to determine the efficacy and specificity of antigens made from such readily available filariids as *Dirofilaria immitis*,

DE OLIVEIRA H L & VEIRA, J A. Sobre um caso de infecção humana pelo *Clonorchis sinensis* — considerações a respeito da técnica de exame da bile para o diagnóstico dessa parasitose. A Case of Human Infection with *Clonorchis sinensis*. 'Diagnosis by Bile Examination.' *Hospital* Rio de Janeiro, 1946 Oct. v. 30 No. 4 509-77 4 figs. 20 refs. English summary.

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H J O D Burk-Galfrey

NASE, M. The Occurrence of *Proleusomium citra* (Sensu, 1892) Axim, 1933 Infection in Man, with a Redescription of the Parasite. Reprinted from *Lab & Med Progress* 1941 Nov. v. 2 No. 2 135-49 5 figs. 38 refs.

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C A Hoare

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L. L. Napier.

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Setaria equina and *Liombosoides carini*. The work of MAZZOTTI and OSORIO [ibid 957] and of CULBERTSON, ROSE and DEMAREST [ibid 770] is briefly reviewed. For details of the authors' technique and experiments the paper itself must be consulted. The antigens were prepared by the method of BOZICEVICH and HUTTER [ibid 1055] for *Dirofilaria immitis* antigen, but modifications were necessary in the case of *Oschocerca volutus* antigen. Adult worms of this species were obtained by extirpation of nodules from human patients.

possibly carried over a control protein solution was made for each antigen, dog serum being used for *D. immitis*, horse serum for *S. equina* and rat serum for *L. carini*. Saline containing 0.3 per cent of phenol was also employed as a

forearm and reactions were read 8 to 12 minutes after the injections. No reaction was considered positive unless the diameter of the antigen weal exceeded that of the control by 3 mm or more. The standards of interpretation of the results are discussed in the paper.

Complement fixation tests were done with antigens from *O. volutus* and *D.*

The authors claim that their results show clearly that *O. volutus* antigen was more sensitive than any of the others used. The *D. immitis* antigen was

complement fixation tests was done on persons suffering from onchocerciasis in endemic areas and on control persons in other areas. The *O. volutus* antigen was more specific than the others. Out of 50 persons examined at Morganton, N.C. who had never been exposed to onchocerciasis, but who harboured *Trichuris*, *Enterobius* hookworms, *Strogylodes* and *Hymenolepis*, the false positives obtained at a dilution of 1:8000 with the respective antigens were: *D. immitis* 10, *S. equina* 11, *L. carini* 6, *O. volutus* 2. In a group of 209 patients in Mexico City not exposed to *O. volutus* but of whom 92 were harbouring *Trichuris*, *Ascaris*, *Enterobius* hookworms and *Hymenolepis*, the number of false positives obtained with the *O. volutus* antigen was half that obtained with the *D. immitis* and *S. equina* antigens. Complement fixation reactions with *O. volutus* antigen were positive in all of 60 patients with *Oschocerca* nodules. Out of 53 of these, 49 gave positive reactions with *D. immitis* antigen. When 43 of the control group of unexposed persons at Morganton, N.C. mentioned above were tested with this antigen, 39 gave

them. *O. volvulus* antigen at a dilution of 1 : 8,000 gave a positive result in 78 of them (96.2 per cent.). At the same dilution the other antigens used gave a lower percentage of positives, which was even less than that given by a dilution of 1 : 16,000 of the *O. volvulus* antigen.

The authors suggest the use of quantitative complement fixation tests as a method of measuring the efficacy of drugs in studies of the chemotherapy of onchocerciasis. G. Lapage.

NETTEL F., R. Contribución al estudio del tratamiento de la Onchocercosis. *Onchocerca volvulus* Leuckart, 1893 (Sin : *Onchocerca caecutiens* Brumpt, 1919). [Treatment of Onchocerciasis.] *Medicina*. Mexico. 1947, Feb. 10, v. 27, No. 525, 53-69, 6 figs. [46 refs.] English summary.

KEVORKOVA, V. I. [On the Method of Diagnosis of Enterobiasis.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 73. [In Russian.]

Where it is inconvenient to make a diagnosis of enterobiasis by making scrapings of the perianal folds and by examining the rectal mucus, especially in the course of surveys, the author recommends the use of a cotton-wool swab. The patient is provided with a swab inserted into a test-tube containing 3-5 cc. of boiled water. In the morning, before rising from bed, he squeezes some of the water out of the swab by pressing it against the wall of the test-tube, then removes the swab and wipes the circumference of the anus with it. The swab, with the material collected in this way, is then returned to the test-tube. On arrival at the laboratory, the swab is thoroughly washed by agitation in the water within the test-tube. The water is then transferred into a centrifuge tube and spun in a hand centrifuge for 2-3 minutes, the supernatant fluid is decanted and the sediment examined microscopically. A comparison of the results obtained with control scrapings showed that the swab method was equally effective. C. A. Hoare.

KUITUNEN-EKBAUM, E. & WEBSTER, Dorothy. Trichinosis in Wild Rats in Toronto. *Canadian J. Pub. Health*. 1947, Feb., v. 38, No. 2, 76-8. [15 refs.]

"An examination of 650 rats, *Rattus norvegicus*, in the city of Toronto showed that 9 rats, or 1.4 per cent., were infected with the encysted larvae of *Trichinella spiralis*."

DEFICIENCY DISEASES.

DE LANGEN, C. D. Iron-Deficiency in Prisoners of War and Internees of Concentration Camps. *Acta Med. Scandinavica*. 1947, Mar. 3, v. 126, No. 6, 546-53.

Professor de Langen examined a number of Dutch civilians some months after their release from prison camps in the Netherlands East Indies. Many of these, although restored to their normal weight and showing no signs of vitamin deficiency, complained of persistent fatigue and muscular weakness. All were found to have very low serum-iron values, ranging from 5 to 80 γ per cent. (normal 125 to 175 γ per cent.) but no, or only very slight, anaemia. It is suggested that this iron-deficiency may be the cause of the weakness and that absorption of heavy metals may be restored to normal far more slowly than other alimentary functions after a prolonged period of starvation.

Dean A. Smith.

WALTERS J H ROSSITER R J & LEHMANN H Malnutrition in Indian Prisoners-of-War in the Far East. A Survey of 2,000 Cases *Lancet* 1947 Feb 8 205-10 [34 refs]

This report summarizes the clinical and laboratory observations made upon 2 000 Indian prisoners-of war from various camps in the Far East immediately after their evacuation to India

Clinical findings included gross wasting massive oedema macrocytic anaemia signs of hyporiboflavinosis nicotinic acid deficiency neuritic beriberi amyloma and a constant cold syndrome which was associated with

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authors emphasize that this finding must be interpreted with caution as the patients were mostly singularly poor subjects for perimetry] and (2) the colour of the tongue in ariboflavinosis is described as fiery red and in nicotinic acid deficiency as pale mauve [The magenta tongue is usually commonest observation]

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	Prisoners-of War (mean)		Controls (mean)
	On Admission	On Discharge	
Hb concentration (gm 100 ml)	10.5	14.3	15.2
Red cells (millions cmm)	2.74	4.64	5.23
Haematocrit (%)	31.9	43.3	45.5
MCH (cu)	119.0	94.3	86.5
MCH (γγ)	39.2	31.1	29.1
Serum protein (gm 100 ml)	5.42	6.83	6.89
Serum albumin (grm 100 ml)	2.63	4.11	4.59
Serum calcium (mgm 100 ml)	8.5	10.8	11.4

In general it could be said that oedema developed when the serum protein level was below 5 gm 100 ml but the development of oedema was more closely correlated with serum albumin level than with total serum protein

In spite of the low level of serum calcium there were no unequivocal signs of calcium deficiency

Investigations relating to plasma volume and blood volume changes are to be the subject of a further report

Dean A Smith

WALTERS J H ROSSITER R J & LEHMANN H Blood-Volume Changes in Protein Deficiency *Lancet* 1947 Feb 15 244-9 4 figs [15 refs]

In a previous report (see above) the authors described their clinical and certain laboratory findings in 2 000 Indian ex prisoners of war They selected a small group for a special study of plasma and total circulating volumes which is the subject of the present paper

Deficiency Diseases.

Vol. 44. No. 7.]

The following measurements and determinations were carried out: serum protein concentration, plasma volume, blood volume, haemoglobin concentration, total circulating red cells, total circulating plasma volume least so, haemoglobin, total circulating plasma volume least so, a control group. The plasma protein fraction (and not, when compared with a control group). In addition to absolute reduction in the summary, the findings were calculated per unit body-weight, body-height and surface area. All measurements involving body-weight were the result of precise interpretation by the presence, in the early stages, of

volume rose very quickly, and only returned to normal at 8-10 weeks. The plasma circulating plasma protein returned to normal rather more slowly (2-12 weeks), and it was only much later (8-16 weeks) that such factors as body-weight, total circulating haemoglobin, haemoglobin and plasma protein concentrations and albumin/globulin ratio returned to normal.

On the basis of these findings, it was possible to calculate the rate of production of haemoglobin, plasma protein and red cells during recovery from starvation of this type, mean values being 7.9 gm. of circulating haemoglobin, 27.2×10^{10} red cells and 2.3 gm. of circulating plasma protein per day.

[This contribution adds considerably to our quantitative knowledge of the changes in blood- and plasma-volume which occur in protein deficiency and the recovery from starvation. Experience in prison camps and of experimental starvation has suggested that nutritional oedema, which was the outstanding clinical feature in many of these cases, cannot be fully explained on the basis of changes in the circulating blood or its constituents, particularly plasma-albumin, alone. Further research is needed, on the lines followed by Lieut.-Col. Walters and his associates, but extended to determine the changes which occur in the extravascular fluid compartments of the body and, possibly, in the permeability of capillary and cell membranes.]

Dean A. Smith.

FEHILY, Lydia. Deficiency Diseases in Reoccupied Hong Kong. *Brit. Med. J.* 1947, Feb. 8, 220-22.

This paper is an interesting sequel to the author's description of nutritional diseases in Hong Kong before the war in the Pacific (*Brit. Med. J.*, 1945, Oct. 6 468). It records that in reoccupied Hong Kong, though the general level of nutrition was low, there was a surprising absence of evidence of specific vitamin deficiency. This is attributed to the fact that the rice consumed, though highly milled, had never been stored long enough to undergo degeneration.

Surveys six months and one year after reoccupation revealed a considerable improvement in general health with great lowering of mortality rates, though there was still evidence of mild Vitamin B-complex deficiency, especially the ocular manifestations of ariboflavinosis, among children in institutions. The high prices of fruit and vegetables led to small isolated outbreaks of scurvy.

Dean A. Smith.

THOMSON, A. M. & FREEDMAN, B. An Epidemic of Riboflavin Deficiency in Indian Troops. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 399-409

Outbreaks of deficiency disease attributable to uncomplicated lack of a single factor are rare. The present paper describes an epidemic among Indian

occurrence of dissemination this was within three and a half months of the onset of the disease in all the twelve cases in the present series and in six of these it occurred within the first three weeks. Dissemination therefore seems to occur during the initial illness without a latent period and the authors consider that dissemination years later must be very unusual.

J T Duncan

DUARTE E Histoplasmosis [Histoplasmosis] *Mem Inst Oswaldo Cruz* 1945
v 43 No 3 457-94 7 figs [50 refs English summary
A critical historical review

HEAT STROKE AND ALLIED CONDITIONS

HENRY P S H & REES W H The Transfer of Heat through Sun Helmets
Brit J Indust Med 1946 Oct v 3 No 4 225-36 4 figs

During the early years of the war of 1939-45 work was carried out by the British Cotton Industry Research Association on the heat protection afforded by military sun helmets. This paper describes the results of the experiments

the helmet were also measured. The Army helmet consisted of a wool felt body stiffened with shellac covered on the outside with khaki drill and lined with aluminium foil or aluminized fabric. It was supported away from the head by small spacers which connected it to the head band whilst allowing a gap between the head band and the helmet. Sometimes a dome shaped drop lining of aluminium foil or aluminized fabric was attached to the head band. Experiments were carried out with the helmet unventilated i.e. with the opening at the top and the gap between the head band and the helmet closed and with it ventilated.

head temperature of 9.3°C when the helmet was ventilated and 9.7° when it was not.

The possibility of improving sun helmets is discussed. If it were practicable to use a metallic or white outer covering there would be a considerable diminution in the amount of solar radiation absorbed. Conduction through the helmet could be reduced by increasing the thickness of the helmet whilst keeping its conductivity low as in the pith helmet. It has been noted that the aluminium lined helmet with a double sided aluminium drop-lining gave the best results. With such a helmet there is a lack of ventilation of the head. It is suggested that improvement of ventilation is the direction in which improvement of sun helmets can best be brought about. The ventilator at the top provides an inadequate opening and trials showed that by increasing the size of the apertures

the rise of temperature within the helmet was substantially decreased. The Appendix to the paper gives the emissivities of various lining materials. It is noteworthy that the temperature of the helmet fell to 10° cent. at 10° cent. with oil.

T. Bedford.

YAGLOU, C. P. & RAO, M. N. Loose versus Close-Fitting Clothing for Work in "Tropical Heat". *J. Indust. Hyg. & Toxicol.* 1947, Mar., v. 29, No. 2, 140-42.

For work in warm and humid atmospheres, one-piece, loose-fitting garments with openings at the ankles, waist, neck and . . . but some believe that an absorbent and cloth . . . the skin may help to facilitate the loss of . . . carried out during the war on behalf of the National Research Council of America; the experiments were done in a room with air and walls at 85°F., and with a relative humidity of 85 per cent. The speed of air movement relative to the subjects was about 70 ft. per minute. The three subjects—healthy men—performed step-climbing at a rate which called for an energy expenditure of 255 calories per hour. Work was done for 25 minutes in each half-hour for a period of at least 4 hours.

The close-fitting garments used were 80/20 cotton-wool knitted union suits, chosen to fit each man individually, and of an average weight of 480 gm. The loose-fitting garments were two-piece cotton pyjamas weighing 320 gm. The tests on these garments were carried out during winter, and during the following summer, further tests were made on the "Quartermaster-General" poplin jungle suit. This latter garment was tested with the trouser legs and the collar open (ventilated) as well as closed (unventilated). Further tests were made with the subjects unclothed.

work in the experiments
a close-fitting union suit
ame damp and sticky as
well as too warm. Adherence of wet clothing to the skin was objectionable. The loose-fitting pyjama suit was the coolest garb. The ventilated jungle suit also remained mostly dry. Similar results were shown by the objective measurements, especially the rate of sweat production.

It is concluded that in tropical heat the rate of sweat secretion during work is a better index of the heat discomfort than is the pulse rate or the rectal, skin or mouth temperature. When solar radiation is no problem, any clothing is a hindrance to body . . . fitting and of light weight . . . should expose as much . . . give ventilation by bellows action. The closing of the jungle suit to keep out mosquitoes imposes considerable heat strain on the wearer. T. Bedford.

WYNNE, R. L. A Simple Formula for the Calculation of Atmospheric Dryness. *Brit. Med. J.* 1947, Apr. 19, 528-9, 1 chart.

In British practice, not enough attention is paid to atmospheric conditions in operating theatres. They are allowed to become too hot, and their humidity is raised by steam from sterilizers. Conditions should be controlled in these places, where the mental alertness of the staff must be preserved, and where the heat-regulating functions of the patient are upset by anaesthesia. An instance is given of the death from heat stroke of a patient operated upon in an underground hospital during the war.

It is recommended that wet and dry bulb thermometers should be more accurate results a ventilated type should be used but results can be obtained by using wet and dry bulb thermometers simply suspended in the air. He gives a simple formula for calculating an index of drying power—a measure of the saturation deficit and suggests that a wet bulb temperature of 70°F should be regarded as the upper limit of safety in an operating theatre. T Bedford

TROPICAL ULCER

GOLDEN A A Comparison of the Pathologic Anatomy of the Central American Tropical Ulcers and those of a Variety of Leg Ulcers of North America
Southern Med J 1947 Mar v 40 No 3 214-17 2 figs

MISCELLANEOUS DISEASES

HEISCH R B Two Years Medical Work in the Northern Frontier District, Kenya Colony
East African Med J 1947 Jan v 24 No 1 3-15 1 fig & 1 map

The author spent two years in the Province and used them profitably. Malaria was common, endemic with seasonal epidemics. *Plasmodium falciparum* and *P. malariae* predominating in different places. The carrier is *Anopheles gambiae* which shows marked seasonal variations in its numbers dependent on the rainfall.

Kala-azar had been suspected in the Province. The author verified its presence and identified an endemic focus at Sericho. Catches of sandflies included *Phlebotomus langeroni* var. *orientalis*, *P. sp. nova*, *Rostala* A (sic), *P. cleides*.

This paper is of more value than can be shown in a summary. It contains much useful material worth consulting by those interested in the region.]

G Macdonald

SHAFFER, L. J. O. Alnham. Report of a Case in which the Patient was a White Woman with Diabetes Mellitus. *Arch. Pathology*. 1947, Feb., v. 43, No. 2, 170-76, 3 figs. [31 refs.]

JENNISON, D. B., HELWIG, E. B. & MILSTONE, J. H. Granuloma Inguinale Involving Buttock and Lymph Node. Cultivation of the Donovan Body in Embryonic Yolk. *Arch. Dermat. & Syph.* 1947, Mar., v. 55, No. 3, 342-54, 8 figs. [13 refs.]

GENERAL PROTOZOOLOGY.

TRUSSELL, R. E. Microagglutination Tests with *Trichomonas vaginalis*. *J. Parasitology*. 1946, Dec., v. 32, No. 6, 563-9, 3 figs. on 1 pl.

Strains of *Trichomonas vaginalis* were grown free from bacteria in a special medium. Doses of washed flagellates, either living or killed by the addition of 1:2,000 formalin or 1:20,000 phenyl mercuric borate, were injected intravenously to rabbits over a period of 13 weeks. Subcutaneous injections of killed flagellates were also made. Blood was withdrawn from the heart of the rabbits from time to time and the separated serum used for microagglutination tests. It was found that the intravenous inoculations caused the development of increasing amounts of agglutinin which in one case was effective in a serum dilution of 1:10,240. Three strains of the flagellate showed a close antigenic relationship as regards agglutination titres of the serum of immunized rabbits. Agglutination absorption tests revealed the same relationship. Similar tests were carried out with sera from 100 patients and 100 healthy patients who are known to belong to the first group, and the results are believed that they can be studied with implications.

C. M. Wenyon.

GENERAL ENTOMOLOGY.

HARVEY, A. E. C. The Care and Maintenance of Laboratory Animals and Arthropod Vectors of Disease. *East African Med. J.* 1947, Jan., v. 24, No. 1, 58-71.

The methods and elementary precautions described so briefly in this paper are well known to workers who have had to learn by experience; it is well therefore that such knowledge should be gathered into one paper and made available to those who have to look after laboratory animals and insect cultures.

... kinds of boxes and cages; diet; ages for weaning and for experiment; types of and immobilization. rearing procedure possibility of wild-

fleas flies (*Musca*) sandflies (*Phlebotomus*) mosquitoes (*Aedes aegypti*) attempts have been made to maintain a colony of *Anopheles gambiae* but they have so far failed however methods found successful by other workers are described

The author rightly points out the danger of allowing insecticides to come or be brought anywhere near insect cultures and insectaries either on contaminated equipment on clothing or on the person H S Leeson

ANDUZE P J PIFANG C F & VOGELSANG E G Nomina de los artrópodos vulnerantes conocidos actualmente en Venezuela [The Harmful Arthropods known in Venezuela] *Bol Entom Venezolana* 1947 Jan 24 v 6 1 16

HARPER J O A Mosquito Survey of Mahé, Seychelles *East African Med J* 1947 Jan v 24 No 1 25-9

VAN SOMEREN E C C Appendix. The Description of a New Mosquito from the Seychelles *Ibid* 29-35 4 figs

Mahé is one of the largest of the Seychelles Islands it is mountainous and forested and the climate is humid Victoria the capital is on Mahé and has a population of 5000 living on the sea front usually in small raised wooden shacks thatched with palm leaves and surrounded by bread fruit trees coconut palms and other vegetation

Mosquito larvae were very rare in tree-holes but two species were taken *Aedes albopictus* and a new species of *Culex* The male female pupa and larva of the latter are described in the Appendix under the new name *Culex (Neoculex) stellatus* Axils of plants contained *Uranotaenia nepenthes* *U. pandani* and *Aedes albopictus* Receptacles in the cemetery provided *A. albopictus* and *A. aegypti* breeding of these two species and of *Culex fatigans* was found on domestic premises but not in shipping in the port area In other places and islands near Victoria larvae of *A. albopictus* *Culex fatigans* and *C. simpsoni* were found.

Adults of *Aedes aegypti* were found with difficulty in one house out of sixty searched but more easily in hotels and offices Out of doors adults of *A. albopictus* and *A. pampaensis* were taken H S Leeson

TSHINAEV P P [Key to the Identification of the Pupae of the Tribe Culicini] *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 3 74 [In Russian]

This is a dichotomous key for the identification of the pupae of the tribe Culicini found in Uzbekistan and comprising species of the genera *Uranotaenia* *Culex* *Theobaldia* and *Aedes* C A Hoare

KHELEVIN N V [On the Biology of *Aedes*] *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 3 63-8 [In Russian]

The author describes the results of laboratory and field experiments on the hatching of the eggs of *Aedes caspius dorsalis* It was found that the hatching of larvae was not synchronized and this peculiarity is regarded as an adaptation to breeding in temporary collections of water The lack of synchronization protects the mosquitoes against complete destruction of the offspring when the breeding place dries up prematurely Furthermore eggs laid at the same

time do not all hatch during the same season, even under the most favourable conditions. The majority of eggs laid in summer have no diapause, while the majority laid in August are already in diapause; on the other hand, eggs laid in September are hatched exclusively after the diapause. C. A. Hoare.

FLOCH, H. & ABONNENC, E. Distribution des Phlébotomes en Guyane Française. [Distribution of *Phlebotomus* in French Guiana.] Institut Pasteur de la Guyane et du Territoire de l'Inini Publication No. 112. 1946, Dec., 7 pp., 1 map.

POTTS, S. F. Particle Size of Insecticides and its relation to Application, Distribution, and Deposit. *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 716-20.

GINSBURG, J. M. Comparative Toxicity of DDT Isomers and related Compounds to Mosquito Larvae and Fish. *Science*. 1947, Feb. 28, 233-4.

PENDSE, G. S., GOKHALE, V. G., PHALNIKAR, N. L. & BHIDE, B. V. Investigation of New Plant Larvicides with special reference to *Spilanthes Acmella*. *J. Univ. Bombay*. 1946, Nov., v. 15, Pt. 3, 28-30.

ACHARYA, C. N. & RAO, K. S. K. Experiments on the Control of Fly-breeding in Compost Trenches. *Indian J. Agric. Sci.* 1945, Dec., v. 15, Pt. 6, 318-27, 2 figs. [25 refs.]

The authors classify existing methods of fly control under the headings mechanical and chemical, biological, thermal and electrical, but none of them was suited to Indian conditions: they were either ineffective or expensive.

Laboratory experiments and field trials were therefore undertaken to discover simpler and cheaper ways of dealing with fly breeding in compost masses. In this paper the authors are concerned only with the house fly (*Musca domestica*) but the work is being extended to include other flies which haunt compost depots. Experiments with different coverings placed on top of the compost mass showed that lowest emergency rates for flies resulted from those masses covered with an earth-dung plaster (1.6 percentage emergence) and with tarred cloth (1.2 percentage emergence) and that two to three days was sufficient to kill larvae and pupae.

These two methods were therefore tested against others in the field in pits, trenches and on heaps. In pits and trenches, they gave similar good results though it was found that to obtain a 95 per cent. kill of larvae the covers had to remain in place for a week from the sixth to the thirteenth day after filling up the pit. On overground heaps, the results were equally good but more care had to be taken, especially in sealing up the edges, and the cost was about double.

Burning a layer of dry refuse on top of an earth cover was also tried. These tests showed that when fire treatment was given on the sixth day, there was a fly emergence of about 10 per cent.; a second fire treatment on the tenth day brought the figure down to 4.6 per cent. Fire treatment was not so effective on heaps as in trenches.

Of the three methods, the authors conclude that the tarred cloth treatment will be found best suited for most compost centres and is the cheapest to operate.

H. S. Leeson.

LINDUSKA, J. P., COCHRAN, J. H. & MORTON, F. A. Flea Repellents for Use on Clothing. *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 767-9.

Tests for repellency to the fleas *Ctenocephalides canis* and *C. felis* were made by impregnating cloth strips and exposing them briefly to heavy flea populations.

Other tests were made by exposing treated stockings while being worn, the

Indalone or "Rutgers 612" "Lethane 384 Special" and "Thanite" gave very poor results

The substances *p* iso prophylphenyl ethyl alcohol and 1,2,3,4-tetrahydro 2-naphthol gave complete protection but their possible toxic or irritant properties have not yet been investigated

J. R. Busvine

BEQUAERT, J. C. The Ticks, or Ixodoidea, of the Northeastern United States and Eastern Canada. Reprinted from *Entomologica Americana* 1945, v. 25 (n.s.), No. 2, 73-120, No. 3, 121-84, No. 4, 185-232 [Issued on May 17, 24 & June 27 1946, respectively]

The author provides an interesting full review of the ticks of the N.E. United States and Eastern Canada. The paper is of general value, as an up-to-date summary in addition to its local importance (to which this summary gives slight attention)

The general section of the paper opens with an account of the effects of the

presence

As the

condition is always accidental one must take the problem further back. In the author's view, though many channels of infection exist, normal transmission among wild animals and birds is by ticks. He summarizes the evidence relating to the transmission of tularaemia among this tick, and the as larvae and nymphs

disseminated in this way. This tick and one or two others that are mentioned do not bite man. He owes his liability to infection, partly at least, to the fact that species of *Dermacentor* attach themselves to him. In Eastern America the important species is *D. variabilis*. This tick is apparently not so good a host as *D. venustus* of Western America. In *D. variabilis* hereditary infection

As regards the tabanid, *Chrysops discalis*, as important, these flies do not feed on rabbits, and though they often bite man there is no evidence that they transmit tularaemia, at least in N.E. America

The author gives an interesting discussion on the effect of ticks, and in sections For instance he considers In some of these species the infection tends to be chronic, so that perhaps these may be carriers; there are, however, large parts of America in which these hares do not occur. In other species, e.g. the cotton-tail, the disease is rapidly fatal, and this infection is one of the causes of the great natural epizootics in these creatures. There are many complications in these stories: some sorts of tick choose different species of host as larvae and adults.

From natural history the author passes to control [and here he writes rather as a biologist than as one of those practical men].

Local records of human cases of Rocky Mountain spotted fever and tularaemia are given in detail, by States and Provinces. The great increase in recent years is attributed to better diagnosis.

The latter two-thirds of the book are of local value. The ticks known from each State and Province are listed, and those of each known host, bird or mammal: we observe that no reptile hosts are recorded. The systematic section includes keys to genera and species, separate keys for larvae and nymphs being given when possible. This is a welcome feature; in view of the differences in biology and feeding habits between some adult ticks and their early stages, the identification of the latter is important. The systematic section includes detailed distribution, habits, and hosts. There are no illustrations.

P. A. Buxton.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

PLATT, B. S. Colonial Nutrition and its Problems. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 379-89. [16 refs.] Discussion 390-98 [YOUNG, W. A.; DAVEY, J. B.; MANIFOLD, J. A.; CHESTERMAN, C. C.; WENYON, C. M.; MANIFOLD; WILLS, Lucy; WALTERS, J. H.; STANNUS, H. S.; PLATT, B. S. (in reply).]

Professor Platt, in this paper, discusses the complex and enormously important problems of colonial nutrition mainly in two aspects. Firstly he deals with the collection of information regarding nutritional health of colonial peoples, the prevalence of signs of deficiency and their relation to the nutrient value of the dietaries, and other evidence from vital statistics, hospital returns and other relevant sources. Examples are taken from information which has become available in the decade 1937-1946. Secondly, he describes the lines on which work is being done to achieve improvement.

The data on which an assessment of the nutritional status must be based are:—

(1) Reports from medical departments of institutional cases of, and deaths due to, nutritional deficiency diseases (such as beriberi, pellagra etc.) and diseases partly attributable to malnutrition (such as anaemias, tropical ulcer, infantile diarrhoea, toxæmia of pregnancy and pulmonary tuberculosis).

(2) Infant and maternal mortality rates.

(3) Infant birth weights.

(4) Evidence of malnutrition from clinical researches.

(5) Surveys of nutritional state in general populations, preferably combined with a study of food consumption, supplies and economy.

Yaws in its later stages is a very grave disease both for the individual and the race and should be whole-heartedly combated without taking into account the problematical consequences of its eradication

[The memoir is a good account of yaws in the Belgian Congo which will be of local and general value alike in bringing together many papers on the subject. It contains no chapter on pathology.] *C. J. Hackett*

MACPHERSON, KENNIE Formerly Maternity Visitor York Road Living in Hospital etc. *Mothercraft in the Tropics* pp xiv+220s 1947 London Toronto Melbourne & Sydney Cassell & Company Ltd [6s]

The writer of this book has had many years experience of child welfare work in the tropics. The book is dedicated to

different ages are set out in considerable detail. Both the physical and—an

A particularly useful feature of the book is the detailed description of the diet most suitable for children at different ages in the tropics. In some cases local Ceylon names of foods are given. It would perhaps have been wiser to avoid these purely local names in a book which is meant to have a wider appeal throughout the tropics.

The second part of the book entitled *Facts a Mother should know* deals with ailments which a mother in the tropics may be called upon to cope with especially if she living is in an isolated place. Chapters dealing with worms infectious fevers tropical fevers venereal diseases acidosis and accidents are included in this part. It is always difficult to give the lay reader a true picture of a disease whilst at the same time retaining scientific accuracy. The author with her wide experience in teaching mothers has achieved considerable success in this direction. This section however could be made even more valuable in future editions if increased emphasis were laid on up-to-date methods of preventing certain of the more important diseases especially malaria. Again for some of the diseases e.g. scabies more modern methods of treatment might be included. Some diagrams also would be useful for example in illustrating methods of protecting food from insects and the correct method of protecting a child's bed with a mosquito net.

Doctors are frequently asked to recommend a reliable book on mothercraft suitable for women going to or living in the tropics. This comprehensive little book full of practical common sense advice may safely be recommended by them. It should prove a very valuable guide for a young mother faced with the difficulties which arise in isolated stations.

Mary G. Blacklock

TROPICAL DISEASES BULLETIN.

Vol. 44.]

1947.

[No. 8.]

SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

Trematodes.

" importance of cysto-
niasis.
" *S. haematobium* were
" leared on the skin of
patients under treatment; two other patients with *S. haematobium* infections showed similar papules, but eggs could not be found in these lesions [compare FISHBON, below]. BADIR (p. 1154) describes a case in which schistosome eggs (presumably of *S. haematobium*) were found in a conjunctival tumour, and adult worms in an orbital vein. KAMEL (p. 1154) discusses the pathology of this condition, noting that cases have been reported from Upper and Lower Egypt.

S. mansoni.—SAUTET and MARNEFFE (p. 462) found natural infection with *S. mansoni* in *Planorbis adowensis* in the French Soudan. MARIANI-TOSATTI (p. 49) reports three cases of *S. mansoni* infection in Eritrea, and describes the clinical features. The disease is not common there.

WELLER and DAMMIN (p. 1155) state that *S. mansoni* eggs were found in almost 10 per cent. of 19,139 men examined for the forces in Porto Rico. VERSIANI *et al.* (p. 754) report on a survey of *S. mansoni* in the State of Minas Geraes, Brazil, the rate of infestation in towns was 8.6 per cent., in rural areas it appears to be considerably higher. LOBO (p. 938) states that *S. mansoni* infestation is as important as malaria in parts of Brazil, and reports on the situation in Bahia.

WELLER and DAMMIN (p. 347) find that an acid-ether technique is better than zinc sulphate floatation for the detection of *S. mansoni* eggs in faeces. Details of the method are given in the original abstract.

OLIVER GONZÁLEZ and PRATT (p. 348) describe the preparation and use of antigens from adults and cercariae of *S. mansoni*. The worms, or the cercariae, are washed and dried; they are then well pulverized and suspended in physiological saline. After centrifugation this suspension (which is 1 per cent. in strength) is used as the basis for dilutions which are either injected into the skin, or used in a precipitin test. Skin reactions in persons infected with *S. mansoni* were positive up to dilutions of 1 in 200,000, whereas controls, even

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

use in *S. mansoni* infestation MASON *et al* (p 1157) note that treatment with tartar emetic is much more effective than treatment with Fouadin in *S. japonicum* infestation. They emphasize the fact that repeated stool examinations may be needed before diagnosis can be made.

In a series of 157 cases of *S. mansoni* infection in Porto Rico treated with Fouadin, 60% obtained in some 50-60 per cent toxic reactions to Fouadin. In 10% of the cases, an electrocardiograph certain

patients with schistosomiasis who were being treated with tartar emetic or Fouadin. Changes were seen in a few which might lead to a wrong diagnosis of myocardial damage. These disappeared on cessation of the treatment but treatment was not changed because of them.

MILLS (p 346) reports good results in *S. haematobium* infections treated with Stibophen or Anthiomaline. He stresses the importance of cystoscopic control throughout the course of treatment.

HERNÁNDEZ MORALES *et al* (p 1045) have treated *S. mansoni* infections with intensive courses of urea stibamine and report favourably on the results. Details should be sought in the original.

Control of schistosomiasis—JANSEN (p 933) reports on the campaign against *S. mansoni* in Pernambuco in which tartar emetic and other antimonials are used on a large scale for therapy, and lime is used for treatment of water. The intermediate host is *Australorbis centricornis*.

BARLOW and ABDEL AZIM (p 753) show that the methods of snail eradication used in Egypt (clearance of weeds and snails by various means and the use of copper sulphate) have been successful in greatly reducing the numbers of snails in canals, drains and streams. A comprehensive plan has been drawn up for

control

solution yielding a minimum chlorine residual of 0.5 p.p.m. may be sufficient to render cercariae of *S. mansoni* non infective.

Schistosome dermatitis—McMULLEN and BEASER (p 138) have identified the adults of *Cercaria physellae*, *C. elvae* and *C. stagnicola* as *Trichobilharzia physellae*.
ducl's only

whereas antigens from filariae and *Echinococcus* fluid gave negative results. They remark, however, that antigens from schistosomes (which they did not test) might give positive results in *Fasciola* infestation, because the two genera are closely related. MARTIN *et al* (p 464) describe a case of *F. hepatica* infestation in which the diagnosis was made by duodenal intubation as a result of which eggs were found. The symptoms included persistent fever, pain and vomiting, but painful enlargement of the liver usually regarded as one of the cardinal symptoms was absent. Treatment with emetine appeared to be successful. HILLEMANN *et al* (p 658) report a case of *F. hepatica* infection in which treatment with emetine was apparently very successful.

LUBANGUI (p 923) reports on the occurrence of *F. hepatica* in the Philippines.

Its cysts are likely to be apparently not yet known.

CAMERON (p. 1048) discusses the parasites carried by freshwater fish in Canada, including certain trematodes and cestodes which infest man.

Cestodes.

HARRIS and HICKEY (p. 138) discuss the occurrence of Diphyllbothriids in Ireland; they have proved that *D. latum* may be found in perch from a lake in County Leitrim.

ELSAESSER (p. 228) discusses the symptoms, diagnosis, and treatment of cerebral cysticercosis, and gives an account of 8 cases. Details should be sought in the original. EDWARDS (p. 659) records a case of cerebral cysticercosis without epilepsy, in which the incubation period was at least 12 years. There was disturbance of vision at one time, but later the only symptom was slight headache.

BARNETT (p. 352) has reviewed progress in the knowledge of hydatid disease (to which he made so many contributions himself); the many points in this paper cannot satisfactorily be summarized further, and should be sought in the original.

COLE (p. 566) gives an account of human hydatid disease in Victoria, Australia. In the main it is restricted to sheep country, and sheep in some places are infested to the extent of 71 per cent. Dogs are infested by eating uncooked offal from slaughterhouses.

LASNIER and CASSINELLI (p. 567) claim that by examination of sputum, hydatid bodies can be seen in patients with hydatid disease, and the diagnosis can thus be made.

GLAXIS in relation to hydatid disease and to biological tests, summing up much of the literature on the subject. The Casoni test and the complement-fixation test (Ghedini-Weinberg) are useful, but may give false positive results in certain conditions. The formation of heterophile antibodies after injection of hydatid fluid may have a certain diagnostic value. If these various tests are negative, the triple response to 2 cc. hydatid fluid injected intradermally each day for 5 days, into a separate part of the skin, is estimated. If a negative complement-fixation becomes positive, within 96 hours of the beginning of the test, and if the blood eosinophilia exceeds 5 per cent., hydatid should be suspected; 5-10 days later an increase of agglutination of sheep erythrocytes, at a titre of more than 1 in 32, again strongly indicates hydatid disease. He points out that persons with anaphylactic reaction to hydatid fluid, absorbed by a skin test, and the release of fluid from hydatid fluid is also, probably, a primary toxin to body cells.

BERBERIAN (p. 939) writes favourably of the effect of the synthetic acridine derivative Acranil, in the treatment of *Hymenolepis nana* infestation.

LARSH (p. 759) has investigated the effect of repeated administration of alcohol in relation to infestation of mice with *Hymenolepis nana* var. *fraterna*.

SHUMEIKO (p. 48) found 44 onchospheres of tapeworms on 210 samples of vegetables examined from the markets of Samarkand; 4 threadworm eggs were also seen.

Charles Wilcocks.

[To be continued.]

MALARIA

- SERGEANT Ed SERGEANT Et & COLLIGNON E Du danger de l'apport de virus palustre étranger dans une contrée assainie [The Danger arising from the Introduction of Foreign Malaria Strains in Controlled Areas] *Arch Inst Pasteur d'Algérie* 1946 Sept Dec v 24 Nos 3/4 199 204 3 figs

In the Ouled Mendil marsh in Algeria the splenic index in 1906 was 15 in 1907 19 and in 1908 53 per cent The threshold of plasmodic danger was thus largely exceeded. The index was thus largely exceeded in preventive doses index remained well below which a rise in the index coincided with the arrival of strangers infected with malaria elsewhere From 1936 to 1944 this population was kept under closer observation in order to study in greater detail the effects of these immigrations on the level of the local endemicity At this period the anopheline breeding grounds had been suppressed or kept under control and healthy labour imported to drain and cultivate the soil remained free from malaria Endemic indices for 1936-38 and 1941-44 are given in graphic form Oscillations in the curves are all attributable to imported infections which were numerous at times Local transmission did not take place Had not the prevalence of the vector species of anophelines been reduced well below the danger level epidemic malaria might well have broken out

Norman White

- PAYNE E H & SANCHES A A Short Statistical Study of 60 000 Dispensary Patients treated in the Interior of Brazil 1944-1945 (North Central Minas Gerais Goiás and North West Bahia) *J Trop Med & Hyg* 1947 May v 50 No 5 90 93 6 charts & 1 map

During the war minerals were required from remote areas of the States of Minas Gerais Goiás and Bahia Brazil There was no existing medical service for the sparse populations of these areas but it was known that malaria and other serious diseases were endemic there For the protection of the industrial

disease was transmitted by another unidentified species The highest incidence was in April after the rains Both *P. vivax* and *P. falciparum* were found There is nothing unusual about the other diseases but this note is interesting since it is the first record of the diseases of these remote areas

Charles W. Wilcocks

- GLAGOLEVA E M [On the Ecology of Larvae of Anopheles in Tadzhik S.S.R. 6 Biotopes of *Anopheles plumbeus* Steph and their Chemical Properties] *Med Parasit & Parasitic Dis* Moscow 1946 v 15 No 5 60-67 [24 refs] [In Russian]

SIDDONS, L. B. *Anopheles stephensi* as a Vector of Malaria in Calcutta. *J. Malaria Inst. of India*. 1946, Dec., v. 6, No. 4, 367-76.

Because of the occurrence late in 1942 of cases of malaria of household origin in central Calcutta, an enquiry was started in May 1943 which revealed a definite increase in locally acquired infection. The author cites several examples occurring up to 1945, which he attributes to the influx of large groups of gametocyte-carriers during the transmission season and to local intensified breeding of *Anopheles stephensi* (type form).

Collection of mosquitoes was done almost entirely in houses; stables were usually ignored. Seven species of *Anopheles* were taken of which *A. stephensi* formed 87.3 per cent. (2,244 specimens), and this was the only species found infected (nine out of 1,052 examined); its total infection rate was 0.85 per cent. (oöcyst rate 0.58 and sporozoite rate 0.56 per cent.). The transmission season is stated to be from late July to late September.

Discussing the number and relative incidence of the members of the vector species recorded in this survey, the author points out that about 80 per cent. of the catch of *A. stephensi* was made in a single testing-place and that very little collecting was done in stables where other anophelines were common; and that, while there is no evidence of a general increase in the population of *A. stephensi*, local increases undoubtedly occur and lead to restricted outbreaks.

H. S. Leeson.

AITKEN, T. H. G. Studies on the Anopheline Complex of Western America. *Univ. California Publ. in Entom.* 1945, v. 7, No. 11, 273-364, 39 figs. [11 pages of refs.]

A very full account is given in this work of the anopheline fauna of western America, and especially of California. The mosquitoes studied comprise *Anopheles maculipennis occidentalis* and *A. m. freeborni*, *A. pseudopunctipennis franciscanus* and its variety *boydi*, and *A. punctipennis*.

The author includes a complete synonymy, as well as descriptions of all stages and keys to their identification. He describes and tabulates morphological differences between related forms and illustrates important details of anatomy by drawings and photographs. Some account is also given of bionomics and disease relationships.

A. m. freeborni is the brown unicolorous form found in the warm, irrigated western regions west of the Divide and is the most important vector of malaria,

.....; elanic form of the cool western sea-coasts and is of little or no importance.

The status of the Mexican form (*A. m. aztecus*) as a malaria vector is disputed.

A. pseudopunctipennis is a variable mosquito in its morphology, its biology and in its disease-transmitting capabilities. The author considers that the true form of this species does not occur in California but is found in more southerly regions. Those present in California are *A. p. franciscanus* and its variety *boydi*, neither of which is a malaria vector.

A. punctipennis is known to be susceptible to infection by *Plasmodium*, but as a natural vector it is of little importance.

The author suggests that laboratory colonies of these mosquitoes be established to facilitate interbreeding experiments, to investigate relationships between the forms of *Anopheles maculipennis* and *A. pseudopunctipennis* respectively, and to enable their susceptibility to plasmodial infection to be determined as present knowledge is based almost entirely on epidemiological evidence.

H. S. Leeson.

HUNT R. & DAVEY Pauline Maintenance of *Anopheles quadrimaculatus* (in the Laboratory) *J Trop Med & Hyg* 1947 Mar v 50 No 3 53-6
2 figs

A colony of *Anopheles quadrimaculatus* is maintained in two adjoining rooms which have a connecting door adults are kept in one and larvae in the other. Temperatures in the adult room are kept between 24° and 26°C and relative humidity is from 75 to 85 per cent. In the larva room temperature is 26.5°C. giving a water temperature of 25°C.

Eggs are removed daily from the adult cages about eight hours after they are laid and are left on damp filter paper for twenty four hours. They are then floated on to tap water in the hatching pans and four hours later dried powdered brewer's yeast and dehydrated brain heart infusion are added in the proportion of 1 mgm of each to 30 ml of water. After twenty four hours 25 mgm of powdered dog biscuit are added to each pan. Next day young larvae are counted into the rearing pans in which the water is about two inches deep and yeast and brain heart infusion are added in the proportion of 1 mgm of each to 60 ml of water. The optimum surface area per larva is given as 0.75 square inches. Dog biscuit is given twice daily the amount increasing from 16 to 160 mgm per 100 larvae each day until the ninth day. Scum is dispersed by a jet of water.

Pupae are concentrated into one large dish after carefully siphoning off the excess water and the dish is put into an adult cage. A safety curtain hangs inside the cage doors to prevent adults escaping when animals are put inside and the cages are covered with a black cloth to darken them and to reduce draught. At first the mosquitoes are fed on 5 per cent glucose but when blood meals commence the glucose is removed and the males die off. Three days later bowls of water containing cones of filter paper are put in for the egg laying females.

The maximum rate of production is 3 000 to 4 000 female mosquitoes every 11 or 12 days requiring the work of two people for two hours a day for six days and for one hour on Sundays.

H S Leeson

YOUNG M D & BURGESS R W The Transmission of *Plasmodium malariae* by *Anopheles maculipennis freeborni* *Amer J Trop Med* 1947 Jan v 27 No 1 39-40

Experimental transmission of a strain of *Plasmodium malariae* by *Anopheles quadrimaculatus* has previously been effected the authors now record its transmission by *A. maculipennis freeborni* from a patient who had been infected by injection of blood. The mosquitoes were kept at about 75°F for 32 days after the infective blood meal one patient was bitten by 3 infective *A. m. freeborni* and one by 3 infective *A. quadrimaculatus*. Both patients became infected.

Charles Wilcocks

TWINN C R Report on the 1944 Anopheline Mosquito Survey in Canada Processed Publ Div Entom Dept Agric Canada Ottawa 1944 Dec 30 No 17 52 pp 2 maps

per cent were anophelines 5,500 mainly larvae were taken in the field and of these 35 per cent were anophelines some adults were bred from larvae

Of sixty species of mosquitoes known to occur in Canada, 27 were taken during this late season survey; 19 species were collected from traps and 26 from field collections. All species in the traps were found in the field except one, a culicine (*Theobaldia alaskensis*) from British Columbia.

Four species of *Anopheles* were taken, namely, *A. occidentalis*, *punctipennis*, *quadrinaculatus* and *walkeri*; the distribution records for these four are tabulated and shown on a map. In addition, published and unpublished records (including those of a fifth species *A. freeborni* [*A. maculipennis freeborni*] from British Columbia) are also listed and mapped.

Detailed records of the distribution of these species, with remarks on their abundance and nature of terrain.

The most widely distributed species, *A. occidentalis*, is recorded for the first time from Nova Scotia and New Brunswick. *A. punctipennis*, though not so widely distributed, was more common than *occidentalis* in some places. *A. quadrinaculatus*, "the common malaria mosquito", seemed to be confined to the coastal region. *A. walkeri* was more attracted to the interior while it was previously known only from the survey revealed its presence also on the Labrador coast. *A. m. freeborni*, the other malaria vector, was not collected but it had previously been recorded from British Columbia.

H. S. Leeson.

GALLIARD, H. & NGU, D. V. Biologie et description d'*Anopheles tonkinensis* Galliard et Ngu 1940. [Biology and Description of *Anopheles tonkinensis*.] *Ann. Parasit. Humaine et Comparée*. 1946, v. 21, Nos. 5/6, 294-301, 3 figs.

ALEXANDRE. A propos d'un cas de fièvre tierce bénigne. [A Case of Benign Tertian Malaria in Belgium.] *Arch. Service de Santé de l'Armée Belge*. 1947, Jan.-Feb., v. 100, Nos. 1/2, 38-9.

A puzzling case, eventually diagnosed by blood examination, in an ex-soldier in Belgium who had served in the Ukraine (Pripiet Marshes).

EINHORN, N. H. Tertian, Quartan and Mixed Malarial Infections. A Survey of Three Hundred and Thirty-four Cases of Infection with *Plasmodium vivax*, Ten Cases of Infection with *Plasmodium malariae* and Eight Cases of Mixed Malarial Infections in Children. *Amer. J. Dis. Children*. 1947, Jan., v. 73, No. 1, 55-86, 3 figs.

This study of the reaction of childhood to malaria infections relates to children admitted to the Gorgas and Colon Hospitals, Ancon and Cristobal, Canal Zone, during a six-year period. The 493 children with *P. falciparum* infections were the subject of a previous report [this *Bulletin*, 1947, v. 44, 393]. The present study deals with 334 children infected with *P. vivax*, 10 with *P. malariae* and 8 with mixed infections. Twenty per cent. of the children with *P. vivax* infections had had at least one attack of malaria by the end of the second year of life. The malaria in 117 out of 334 children with *P. vivax* malaria was associated with intestinal helminthiasis. Cerebral and algid forms of *P. vivax* infections are rare. Enlargement of the spleen and liver, anaemia and subnormal weight were common in recurrent malaria; associated infections may have been partly responsible. Deaths from *P. vivax* malaria are uncommon; there was no death in this group of 334 cases. Quinacrine hydrochloride (mepacrine) is highly effective in the treatment of all forms of malaria in children.

Norman White.

WINCKEL C W
des Pays B
Countries]

A remarkable increase in the incidence and relapse rate of benign tertian malaria has occurred in recent years in the Low Countries where the disease is endemic. For some time various workers in Holland had been employing SINTON's well known combination of plasmoquine and quinine treatment in the prevention of relapses. unpublished work of Dr J T BIJLMER is quoted to indicate the satisfactory results obtained between 1940 and 1943 in this way.

When German supplies of plasmoquine ceased the Low Countries were reduced to employing quinine alone and as a result relapses became more frequent. arrangements have now been made for the importation of pamaquin from Britain in the form of pamaquin naphthoate.

The Netherlands authorities have now provided doctors and pharmacists with tablets each containing 150 mgm of quinine sulphate and 9 mgm of pamaquin. The adult dose is 5 to 6 tablets daily with proportionate reductions for children. Treatment is continued for 14 days. it is found that the relatively small daily dose of quinine (less than 1.0 gm) is adequate. The toxic properties of the plasmoquine group are noted but they are rarely found with the course of treatment described especially if the precaution is taken to see that they are not taken on an empty stomach. The importance of ensuring that the full course is taken regularly by patients is stressed.

The author hopes that this form of treatment will serve to reduce the number of relapses of benign tertian malaria of experimental work during the last year problem of dealing with

BANG T B HAIRSTON N G TRAGER W & MAIER J Treatment of Acute Attacks of Vivax and Falciparum Malaria. A Comparison of Atabrine and Quinine. *Bull U S Army Med Dept* 1947 Jan v 7 No 1 75 89 10 figs [Refs in footnotes]

This comparative study of the value of mepacrine and quinine in the treatment of malaria was carried out on white non immune well nourished soldiers who were infected during campaigns in New Guinea. The dosages of mepacrine administered were 1.2 gm the first day, 0.6 gm each day for four days, 3.6 gm in solution was 3 gm a day for three days.

Eighty nine patients with *P. vivax* infections were treated with quinine alone and 367 with mepacrine alone. Mepacrine was superior to quinine but the difference was less than the effect of immunity conferred by a few previous attacks of malaria.

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to the two treatments

Six of 110 patients treated with mepacrine developed cerebral symptoms on the 5th or 6th day of treatment after the infection had been controlled. Four of these patients had manic states with confusion and two had an epileptiform

convulsion. Recovery was complete in all cases after from 12 to 48 hours. Mepacrine levels in these cases did not differ significantly from the average in the series.

Norman White.

CUSTER, R. P. Aplastic Anemia in Soldiers treated with Atabrine (Quinacrine). *Amer. J. Med. Sci.* 1946, Aug., v. 212, No. 2, 211-24, 4 charts & 14 figs.

Aplastic anaemia was the cause of a disproportionately large number of deaths in the south and south-west Pacific areas where mepacrine therapy for malaria suppression was rigidly enforced. In these areas, during 1943 and 1944, the incidence of the disease was nearly $2\frac{1}{2}$ times as high as among troops not taking the drug, and it showed a rapidly and steadily progressive increase with each succeeding half-year period. The actual number of cases was, however, infinitesimal compared with anticipated morbidity and mortality from malaria had suppressive therapy not been employed.

In 57 cases studied in detail, no correlation was found between the anaemia and the administration of any drug other than mepacrine, or exposure to any other aetiological factor; in 25 cases the anaemia was preceded by the atypical lichen planus which has been suggested also to be associated with the administration of mepacrine.

After a prodromal period of weakness, the disease became manifest clinically by haemorrhages, from the mucous membranes and into the skin, associated with fever. The patients were rather pallid and blood examination showed varying degrees of anaemia, generally normocytic and normochromic, without material reticulocytosis; the leucocyte and thrombocyte counts were significantly low. Examination of the bone marrow showed depletion of normal haematopoietic elements often almost complete; there was no evidence of extramedullary haematopoiesis. It is suggested that the condition may be due to a slowly acquired hypersensitivity, the antigen possibly being formed through interaction of drug and protein.

F. Murgatroyd.

JOHNSTONE, R. D. C. Paludrine in Relapsing Benign Tertian Malaria. Further Trials. *Lancet.* 1947, May 17, 674-5.

Following trials with paludrine [see this *Bulletin*, 1947, v. 44, 284] a further series of cases of benign tertian malaria were treated at Colchester with combination of paludrine and quinine. Most of the patients had probably been infected in India or Burma: a few had been exposed in the Far East and other areas.

In all, 61 patients were treated on the following courses, on an alternate-case basis.

(1) Quinine gr. 10 and pamaquin 0.01 gm. t. d.s. for 10 days.

(2) Quinine gr. 10 and paludrine 0.25 gm. t.d.s. for 10 days.

Follow-up records were obtained in 58 out of the 61, over a period of six months.

Results of Treatment.

Course	No. of cases	No relapse	Proved relapse	Clinical relapse*	Percentage of proved relapses	Percentage of total relapses
Quinine and paludrine	29	18	3	8	10.3	37.9
Quinine and pamaquin	29	24	2	3	6.9	17.2

* The criteria of clinical relapse includes the history of a rigor and a tertian periodicity of symptoms.

The average intervals between the date of arrival in U K and the date of admission to hospital were for quinine paludrine 4.8 months and for quinine-pamaquin 4.1 months

The average intervals between treatment and further relapse were, for quinine paludrine 3.7 months

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action similar to that of pamaquin has not been confirmed

P Manson-Bahr

BLASCHKO H CHOU T C & WAJDA Isabelle The Inhibition of Esterases by Paludrine *Brit J Pharmacol* 1947 June v 2 No 2 116-20 [13 refs]

HALAWANI A BAZ I & MORKOS F A Preliminary Report on the Anti-malarial CAM-AQI *J Roy Egyptian Med Ass* 1947 Feb v 30 No 2 99-103

CAM AQI is described as a quinine derivative containing an aniline radicle. Its formula and properties are described and it is claimed that (1) it is several

toxic as quinine in laboratory animals and produces similar pathological changes in them after prolonged administration (6) in man 1 gm of the drug in 24 hours did not produce toxic symptoms but caused complete interruption of benign tertian malaria. The source of manufacture is not stated.

The author tested CAM AQI in 42 patients 30 of whom were followed up

for three doses

In general vegetative forms of the parasites disappeared by the 2nd day but P₂ the drug did not see Weekly blood examn 5 months no parasitological or clinical relapses were observed

apparently related to dose age or weight no staining of the skin was seen one patient was six months pregnant and was cured of her malaria without showing any ill effects from the drug

[A drug for which such satisfactory claims are made requires to be investigated re fully in greater detail and with adequate controls]

H J O D Burke Gaffney

- CURD, F. H. S. & RAISON, C. G. Synthetic Antimalarials. Part XIII. Some N-Dialkylaminoalkylamidines. *J. Chem. Soc.* 1947, Feb., 160-64.
- WORK, T. S. The Synthesis of Antimalarial Compounds related to Niquidine. Part III. Alternative Synthesis of Dihydro- α -niquidine. *J. Chem. Soc.* 1947, Feb., 222-4.
- CURD, F. H. S., LINDQUIST, J. K. & ROSE, F. L. Synthetic Antimalarials. Part XII. Some 1 : 3 : 5-Triazine Derivatives. *J. Chem. Soc.* 1947, Feb., 154-60.
- CHENG FANG TSU. Chang Shan in the Treatment of Malaria. *J. Trop. Med. & Hyg.* 1947, Apr., v. 50, No. 4, 75-7.

TONKIN and WORK [this *Bulletin*, 1946, v. 43, 1012] reported that the indigenous Chinese drug *chang shan* was effective against *P. gallinaceum* infection in chicks.

The present author investigated the drug, which has been in use in China for more than 2,000 years, in hospital patients suffering from different varieties of malaria. The immediate vomiting characteristic of the action of the drug was eliminated by the use of an alcohol-soluble fraction, freed from alcohol and dissolved in water, and the employment of a maximum single adult dose of 5 ml. of a 6 per cent. solution (0.3 gm. solids). In doses in excess of this, abdominal discomfort or vomiting occurred in about 10 per cent. or more of adult patients.

The usual daily dose finally adopted was 25 ml., corresponding to 1.5 gm. of extract or 25 gm. of dried *chang shan* root. This dosage was given for 12 to 15 days in benign tertian malaria and for 20 days in subtertian. Administration by the mouth was usual, but intramuscular injection did not produce an unduly severe local reaction in the few cases in which it was used. Gastric symptoms were further prevented by pre-medication with bismuth subnitrate or hyoscyamus and sodium bicarbonate. No other secondary effects were observed, even with an augmented dose of 8 ml. five times daily.

Among 587 outpatients, 67 per cent. of 322 benign tertian infections and 69 per cent. of 253 subtertian infections were cured.

malaria, symptoms subsided between the 1st and the 6th days in 97 per cent.; they subsided by the 3rd day in 64 per cent. of these. Parasites disappeared between the 3rd and the 6th day in 88 per cent., averaging 22 per cent. for each day; a further 12 per cent. lost their parasites by the 7th day, so that all were parasite-free within a week. Splenic enlargement disappeared between the 4th and the 9th day in 54 per cent., diminished thereafter in 10 per cent. and persisted in the remainder after 10 days. Relapse occurred in 6 of the 67 patients. In the case of 14 patients with subtertian malaria, treatment was successful in 11 by the 2nd or 3rd day: in a further 22, a combination of *chang shan* extract and plasmoquine resulted in 16 cures, as judged by the criteria quoted.

Comparative studies of *chang shan*, quinine and of a tonic only were made in three groups of patients suffering from benign tertian malaria, in order to exclude cure by natural immunity. In 12 of the first group, fever subsided on the 1st or 2nd day and parasites disappeared before the 7th: in the three patients treated with quinine, fever subsided before the 4th day and parasites disappeared by the 7th. In only one of the 8 control cases, was a negative blood picture obtained; in three of these cases, fever subsided on the 2nd, 5th and 7th days, respectively, and was still recurrent on the 10th day in the remainder.

It was noted that in a number of cases morphological and staining abnormalities in the plasmodia occurred in blood films taken 4 to 48 hours after

and proprietary antimalarials are not }

H J O'D Burke-Gaffney

PARROT L CATANEI A & COLLIGNON E Nouveaux essais de prophylaxie collective du paludisme par les médicaments synthétiques (troisième mémoire) [Further Trials of Mass Prophylaxis of Malaria with Synthetic Drugs] *Arch Inst Pasteur d'Algérie* 1946 Sept-Dec v 24 Nos 3/4 205-78 39 diagrams

In 1944 the authors published the results of a trial to control malaria in a highly malarious area at the mouth of the Reghaia wadi in the Department of Algiers by the weekly administration of either quinacrine or premaline S to all its inhabitants throughout the transmission season [this *Bulletin* 1945

In 1944 and 1945 a comparison of the prophylactic value of the two preparations was tested once again but this time the drugs were administered twice weekly the total amount of drug administered being one-third greater than on the previous occasion (0.1 to 0.2 gm of quinacrine twice weekly one to two

1 drugs afforded a
years were mild

The carriers of gametocytes were fewer among the recipients of premaline than in the quinacrine group but the gametocidal action of premaline exercised insufficient influence on the association of pre-malaria in Algeria

KNOWLES F L A Definition of Malaria Control *J National Malaria Soc* 1946 Dec v 5 No 4 233-43 1 fig [13 refs]

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deductions on the number of mosquitoes necessary to ensure the continuation of transmission in populations containing various proportions of gametocyte carriers. He also sets out to assess the relative value of different methods of malaria control such as adult mosquito destruction and the prevention of breeding

[In neither case does the reviewer arrive at the same deductions as the author. The whole approach to malaria transmission discussed is vitiated by failure to

take into account the normally self-curing nature of the disease. While the reviewer agrees that destruction of adult mosquitoes is one of the most effective means of malaria control, he does not consider that this fact can be deduced from the mathematical data provided.]

G. Macdonald.

GUILLAUME, A. La lutte contre les moustiques en Alsace. Complexité du problème. [Anti-Mosquito Measures in Alsace.] *Rev. Paludisme et Méd. Trop.* 1947, Apr. 15, v. 5, No. 35, 101-4.

COLLIGNON, E. La campagne antipaludique de 1945 dans le département d'Alger. [Antimalaria Campaign of 1945 in the Department of Algiers.] *Arch. Inst. Pasteur d'Algérie.* 1946, Sept.-Dec., v. 24, Nos. 3/4, 279-88.

The department of Algiers suffered but little from malaria in 1945, meteorological conditions being generally unfavourable to anopheline propagation. The prevalence of malaria was low, the rainfall in the second half of 1945, the rainfall in the spring. In 1945, the rainfall was low. The few isolated outbreaks determined by local conditions were of short duration. Antimalarial work was hampered by lack of transport. Norman White.

WEATHERSBEE, A. A. Malaria Control Activities during the Construction of an Advanced Tropical Naval Base. *J. National Malaria Soc.* 1946, Dec., v. 5, No. 4, 263-76, 8 charts.

The construction of some naval bases in the Caribbean region was seriously impeded by outbreaks of malaria. The assistance of malariologists was sought, a full survey was carried out and a complete control scheme introduced. The methods of survey and control were of standard types. The paper is of interest for its account of the application of these methods under the special circumstances of the Caribbean region. Control was completely effective and resulted in the virtually complete elimination of anophelines (*A. albimanus*) and malaria from the area.

G. Macdonald.

MACINNES, D. G. On the Effect of DDT-Treated Surfaces on Adults of *Anopheles gambiae* and *A. funestus*. *Bull. Entom. Res.* 1947, May, v. 33, Pt. 1, 123-30, 1 fig.

in cages containing mosquitoes was kerosene, etc., at DDT-treated surfaces.

A sixty-minute exposure in a cage with three wooden sides treated five months before with 200 mgm. DDT per sq. ft., killed 22 per cent. adults immediately and 100 per cent. within three hours. A five-minute exposure did not kill any immediately, but 17 per cent. were dead within three hours and 73 per cent. at twelve hours. These results were more favourable than those reported by KNIPLING [his *Bulletin*, 1946, v. 43, 493] for *A. quadrimaculatus*.

Anopheles adults in DDT-treated cages display pronounced restlessness. [See KENNEDY, this *Bulletin*, 1947, v. 44, 561.] J. R. Burvine.

TRYPANOSOMIASIS

LAUNOY L. & LAGODSKY H

curative et preventive de
trypanosomoses experimer

Action of Pentamidine in different Trypanosome Infections in the Rat
C R Soc Biol 1946 Dec v 140 Nos 23/24 950-52

They then give further details of some of their own findings

A subcutaneous dose of 30 mgm per 100 gm body weight is regarded as the toxic dose (*Dt*) for rats. A dose of 2 or 3 mgm/100 gm protected rats against the Pasteur Institute or the London strain of *T. brucei* for 30 days. 5 mgm protected against the former strain for 100 days. 10 mgm protected against the London strain of *T. equiperdum* for 90 days and 25 mgm protected against the Pasteur Institute strain of *T. evansi* for 30 days. There is a clear correlation as might be expected between size of dose and duration of protection period. Thus a dose of 0.25 mgm protected against *T. brucei* for only 7 to 11 days. 5 mgm for 90 to 100 days and intermediate doses for correspondingly intermediate periods.

The ratios of curative dose to toxic dose (*Dc/Dt*) in different infections in rats were as follows — Pasteur Institute *T. brucei* infections 1/60
London *T. brucei* 1/33 London *T. equiperdum* 1/30 Pasteur
Institute *T. evansi* 1/24 E M Lourie

FEVERS OF THE TYPHUS GROUP

BRICEÑO ROSSI A. L. & BRICEÑO-IRAGORRY L. Las Rickettsias en Venezuela
[Rickettsial Diseases in Venezuela] VII Conferencia Sanitaria Panamericana
Ciudad de Mar del Plata. Publicaciones de la Comisión Organizadora No 11
Caracas 60 pp 3 charts & 1 map [Bibliography]

A survey of the history, distribution and general epidemiological and diagnostic features

GEAR J. H. S. & MURRAY N. L. Typhus Fever in the Eastern Transvaal with special reference to an Epidemic occurring in 1945. *South African Med J* 1947 Apr 12 v 21 No 7 214-18

Outbreaks of louse borne typhus are said to occur almost every year among Africans in the high veld of the Eastern Transvaal. Control was difficult till DDT came into use but now there is a good prospect of eradicating the disease in this and other areas of South Africa with the help of this insecticide of which already 700 tons have been produced at the factory of the Ministry of Supply, Northrand. Manufacture of the chemical was started in 1944 in response to an enquiry by the junior author and under the sponsorship of the Department of Defence.

The authors suggest that fabrics can be more effectively treated with a 50 per cent solution of DDT in kerosene applied as a spray than by dusting with the powder which can to some extent be shaken off.

For the immediate detection of the nature of an outbreak, a rapid slide test was found of value: a drop of *Proteus OX19* suspension stained with methylene blue was mixed with a drop of finger blood on a slide, and simultaneously a slide test was carried out with a stained suspension of *Salm. typhi* 0901. Cases in the 2nd or 3rd week, or during convalescence, were selected for the tests.

Five strains of rickettsiae were isolated; all of these caused scrotal reactions

epidemic than with murine antigens.

John W. D. Megaw.

PAYZIN, S. Riketsiyaların mukavemeti hakkında yapılan ve aşı istihsalinde tatbik edilmekte olan metodlar. [Survival of Rickettsiae.] *Türk Hifzisihiha ve Tecrübi Biyoloji Mecmuası (Rev. Turque d'Hyg. et de Biol. Exper.)*. Istanbul. 1944, v. 4, 64-7, 1 fig. French summary 67-8.

The author records the following results of experiments carried out in his Typhus Vaccine laboratory:

1. Rickettsiae cultivated on chick embryo and diluted 1/10 in normal saline remained viable for one week at 40°C.

2. The same rickettsiae diluted 1/10 in a mixture of Tyrode solution and horse serum remained viable for 18 days at -10°C., but were no longer viable after 20 days at -14°C.

3. Dilutions in Tyrode solution alone gave a result almost identical with that given by normal saline.

4. The membrane of the infected embryo, triturated and solidified rapidly in ampoules with CO₂ snow, were dried *in vacuo* in the presence of P₂O₅ and sealed under H₂. These were still living after 132 days at -14°C. When similarly prepared, but without the H₂, the same material could not be cultivated after 14 days.

H. J. O'D. Burke-Gaffney.

GIROUD, P. & CIACCIO, G. Essais d'inoculation de *Rickettsia prowazekii* chez les insectes. Conservation de la virulence pour le cobaye après passage par chrysalides de *Bombyx mori* et chenilles de *Tenebrio molitor*. [Experiments in Inoculation of Insects with Rickettsia Prowazekii. The Maintenance of Virulence

BOL. OFICINA SANITARIA PANAMERICANA. 1946, Dec., v. 25, No. 12, 1075-8. English summary. Antígeno X-19 para el diagnóstico del tifo exantemático. [X-19 Antigen for the Diagnosis of Typhus Fever.]

At the first Inter-American Typhus Meeting, held in Mexico in October 1945, the Pan-American Typhus Commission recommended the use of Castañeda's "X-19" antigen for the diagnosis of typhus fever. The "X-19" antigen is a classical rickettsial suspension used.

Uniform X-19 antigens require to be made at present in the Typhus Laboratory of Mexico.

Details are given of the preparation and standardization of the antigen, and of the rapid bedside test.

H. J. O'D. Burke-Gaffney.

GIROUD P La conservation des virus typhiques exanthématiques les maladies inapparentes les maladies latentes [The Maintenance of the Typhus Infections. Inapparent and Latent Attacks] *Bull Soc Path Exot* 1946 v 39 Nos 11/12 407 14 [13 refs]

This paper deals with the carry-over of infection by sub-clinical and latent forms of typhus fever

The author briefly marshalls the evidence pointing to the occurrence of sub-clinical infections he regards the Weil Felix test as fallacious in being negative in some cases of actual infection and positive in some cases in which the disease does not exist in fact he regards the reaction as being either the presence of *O*19 The to be a truly

The author mentions that the Weil Felix reaction was positive in 9 of 18 uninfected pregnant women at a titre of 1/100 whereas it does not appear

Examples are given of the isolation of rickettsiae from apparently healthy persons and the conclusion is reached that the rôle of inapparent infections has been established

John H D Megaw

LACHNIT V Beobachtungen an 244 Fleckfieberfällen [A Study of 244 Cases of Typhus Fever] *Wien med Woch* 1947 May 10 v 97 Nos 18 19 17 21 [21 refs]

This paper consists of a good general description of the clinical features of 244 cases of typhus fever studied in a war hospital in middle Europe between

leucocyte count was 4 000 to 7 000 per cmm and there was a pronounced deviation to the left Later there was moderate leucocytosis—9 000 to 16 000 high grade leucocytosis occurred only in the presence of complications

In about 50 per cent of the cases there was a nephritic type of urinary sediment with various types of casts and red blood cells The diazo reaction was usually positive

Strophantoxin and glucose were given to all the patients as soon as they were admitted Large doses of calcium gluconate were also given

John H D Megaw

GIROUD P Pouvoir antigène comparé de suspensions de rickettsies purifiées ou non par agitat on avec un liquide non miscible [Comparison of the Antigénic Potency of Crude Rickettsial Suspensions with Suspensions Purified by shaking with a Liquid not Miscible with Water] *C R Soc Biol* 1946 Jan v 140 Nos 1/2 32-4

BRUMPT L C La prophylax e du typhus pendant le rapatriement. [The Prevention of Typhus during Repatriation.] *Bull Internat Services de Santé des Armées* Liège 1947 Mar v 20 No 3 83-9

NELSON, C. T. The Serologic Response in Murine Typhus as measured by the Weil-Felix, Rickettsial Complement Fixation, and Rickettsial Agglutination Reactions. *J. Lab. & Clin. Med.* 1947, Apr., v. 32, No. 4, 360-66, 1 fig. [26 refs.]

Weil-Felix, rickettsia-agglutination, and complement-fixation tests were carried out at frequent intervals on sera from 22 murine-typhus patients. With the technical methods employed, which are fully described, the author found that the titres obtained with the first two tests rose earlier and more steeply than with the complement-fixation test, which remained negative in nearly one-third of the cases three weeks after the onset, whereas the agglutination tests were always positive by that time.

The rickettsia-agglutination test was carried out by the slide technique described by FITZPATRICK [see this *Bulletin*, 1945, v. 42, 982]; the antigens used kept well for at least six months at refrigerator temperature. The test is said to be superior to the Weil-Felix reaction in being more specific and in permitting the same degree of differentiation between murine typhus, classical typhus, and Rocky Mountain spotted fever, as is obtainable with the complement-fixation test.

Three cases of Rocky Mountain spotted fever were studied; in none of these was there any cross-agglutination when the murine antigen was employed; this result is opposed to the finding of PLOTZ, who found that sera from 13 patients suffering from Rocky Mountain spotted fever agglutinated murine and classic rickettsiae [see this *Bulletin*, 1945, v. 42, 636].

[It is to be hoped that the Fitzpatrick technique will be tested on a large scale and that the results already obtained will be confirmed.]

John W. D. Megaw.

DAVIS, D. E. The Use of DDT to control Murine Typhus Fever in San Antonio, Texas. *Pub. Health Rep.* Wash. 1947, Mar. 28, v. 62, No. 13, 449-63, 2 folding maps.

The author describes a large-scale experiment designed to test the efficacy of DDT dust to the haunts of rats as a method of the destruction of rat fleas.

Described as encouraging, but their significance is not easy to assess in view of the following statements:—"The flea indices of these rats are a measure of the efficiency of the crew; they are not a measure of the efficiency of DDT" and "From our experience we have become satisfied that when DDT is thoroughly and carefully put out the number of fleas can be reduced almost to zero."

In the experiment the average quantity of DDT powder used for each room was about four ounces, but the reduction in the flea indices was disappointingly small.

The paper will be of special interest to workers who contemplate the use of DDT as a method of rat-flea control.

John W. D. Megaw.

MILLSPAUGH, D. D. & FULLER, H. S. The Occurrence of *Trombicula deliensis* Walch in Southwestern China. *Amer. J. Hyg.* 1947, Mar., v. 45, No. 2, 204-5.

Although scattered cases of scrub typhus occurred amongst American troops in China, and the presence of the disease there has long been suspected, its

[August, 1947]

occurrence has apparently not been clearly demonstrated only 5 cases were reported by the National Health Administration of China between 1940 and 1945 and these were in Kweichow and Kunning.

In August 1945 the authors working from the China Burma India Field Headquarters U S A Typhus Commission collected a considerable number of mammals and birds and their ectoparasites near Kunning (Yunnan Province) and Kweichow (Kweichow Province). No attempts to recover rickettsiae by animal inoculation were made. In an area 15 miles south west of Kunning at an altitude of 6 000 feet specimens of *Trombicula deliensis* Walch were identified from an insectivora. 3 genera of rodents and a bird. This wide choice of hosts accepted by the mite confirms the observations of MACKIE *et al* in Burma and Assam (this Bulletin 1946 v 43 917).

The hosts concerned were the Chinese tree shrew (*Tupaia belangeri chinensis* Anderson), Vole (*Eothenomys miletus miletus*), Sulphur bellied rat (*Rattus confucianus confucianus*), Tree squirrel (*Dremomys pernyi flavior* Allen), and White-cheeked laughing thrush (*Dryonastes sinensis*).

These are claimed to represent new host species and localities for *T. deliensis* and it is also stated that this is the first record from China of this mite.

The authors point out the strong suspicion that *T. deliensis* may play a rôle in the transmission of scrub typhus in south west China.

H J O D Burke Gaffney

McLIMANS W F & GRANT C W Therapy of Experimental Tsutsugamushi Disease (Scrub Typhus) *Science* 1947 Feb 14 181-2 2 figs

By a series of rigidly controlled experiments the authors have shown that methylene blue mixed with the food in a concentration of 0.2 per cent is strikingly effective in controlling infection caused among Swiss mice by intra peritoneal injections of virulent *Rickettsia tsutsugamushi*.

The treatment when started 96 hours after inoculation reduced fatality rate from 90-100 per cent to 30-40 per cent and when oxygen was given in addition in an oxygen tent the rate was further reduced to 20-30 per cent.

PABA (para aminobenzoic acid) given in the same way at strengths of 0.4 to 1.9 per cent was less effective and it ceased to have a demonstrable action when administration was started 120 hours after inoculation whereas methylene blue plus oxygen still had some effect when started 192 hours after inoculation.

John W D Megaw

WALKER W T Scrub Typhus Vaccine Its Effect on Sixteen Cases incubating the Disease *Brit Med J* 1947 Apr 12 484-7, 4 figs

The author reports that scrub typhus vaccine prepared in Operation Tyburn at Frant in Sussex appeared to have produced a favourable effect on 16 men who had received one or more doses a short time before the onset of attacks of scrub typhus [see this Bulletin 1946 v 43 435 and 436].

Among one group of seven patients who had received only one dose less than three days before the onset the average duration of the fever was 21.5 days but the patients are said to have been remarkably free from toxic symptoms though two are reported as having had circulatory collapse.

Five patients had received only one dose three or more days before the onset, in these the average duration of the fever was 14.5 days and all were 'moderately toxic'.

Two patients had received two doses each at a week's interval, the second just before the onset; neither "was really ill".

Two patients had received the full course of three doses, the last just before the onset; neither patient felt at all ill; the duration of the fever was nine days in one and ten days in the other.

John W. D. Megaw.

CARD, W. I. & WALKER, J. M. Scrub-Typhus Vaccine: Field Trial in South-East Asia. *Lancet*. 1947, Apr. 12, 481-3, 1 fig.

The authors have analysed the salient features observed in attacks of scrub typhus which occurred in 33 men to whom the "Operation-Tyburn" vaccine had been administered.

In seven of the patients, a full course of three doses had been given, but there was no indication of any pronounced effect on the duration or severity of the disease.

There was no death among the 33 patients who had received one or more doses of the vaccine, but the fatality rate among the unvaccinated troops during the same period was only 30 per cent. so the author rightly concludes that the findings have no statistical significance.

[From this and the preceding abstract it appears that the efficacy of the vaccine has not yet been proved, but the scanty evidence available does not exclude the possibility that a full course may lessen the severity of subsequent attacks.]

John W. D. Megaw.

GREENBERG, M., PELLITTERI, O., KLEIN, I. F. & HUEBNER, R. J. Rickettsialpox—a Newly Recognized Rickettsial Disease. II. Clinical Observations. *J. Amer. Med. Ass.* 1947, Mar. 29, v. 133, No. 13, 901-6, 7 figs.

The authors describe the clinical features of 144 cases of this newly recognized rickettsial disease [see this *Bulletin*, 1947, v. 44, 411].

The initial lesion appeared, on the average, about seven days before the onset of the fever, first as a small rounded papule in the centre of which a vesicle was gradually formed, and eventually there was a firm black eschar. The lesion persisted about three weeks, leaving a scar; it was seen in 95 per cent. of the patients who were under constant observation.

The onset of the fever was sudden, with chills, sweating, and pain in the back. The temperature rose rapidly to 103-104°F.; the fever was remittent, lasted 1-10 days, and ended by lysis.

A rash was seen in all the cases. It first appeared on the day of the onset or on one of the four following days; it lasted 4-7 days in most of the cases. The lesions at first were erythematous and maculopapular; they soon became vesicular in the centre, and, on drying up, dark crusts were formed; there was no scarring. The number and distribution of the spots were very variable. All the patients recovered without complications.

Moderate leucopenia was usual. Negative results were obtained with blood

[August 1947]

VALLEJO FREIRE A. Spotted Fever in Mexico Immunological Relationship between the Virus of the Rickettsiosis observed in Sonora and Sinaloa, Mexico, and other Spotted Fever Viruses Mem Inst Butantan 1946 July v 19 159 79 [25 refs]

The author describes the results obtained in a study of a strain of rickettsia isolated in Mexico by BUSTAMANTE and VARELA from a patient whose disease was diagnosed as Rocky Mountain spotted fever in Sonora and Sinaloa, Mexico. The diagnosis was made on clinical grounds and on the finding by R. R. PARKER that the rickettsia could not be differentiated from virulent strains of the organisms of Rocky Mountain spotted fever. [See this Bulletin 1945 v 42 203 and 1946 v 43 1134]

The author found complete cross protection among guinea pigs surviving from inoculation with the Mexican and Sao Paulo strains of rickettsiae against infection with both the above strains.

Rabbits inoculated with both strains gave similar responses to the Weil-Felix test: rising titre reactions with Protei is OX19 OX2 and OX4 and negative reactions with OXA.

Some of the rabbits before inoculation gave high titre responses to the tick but the titres fell or remained constant during the illness.

The name spotted fever is suggested as being most suitable for the tick borne typhus like fevers of North and South America. [But the name spotted fever when used without qualification has been applied to cerebrospinal meningitis and to other forms of typhus but is obviously unsuitable for a disease with a very wide distribution. The name tick typhus is descriptive and pending a final judgment on the relationship between the tick borne fevers of the typhus group the present disease might well be designated as tick typhus of the Rocky Mountain type.]

John H. D. Megaw

RAVENEL S. T. Para-Aminobenzoic Acid Therapy of Rocky Mountain Spotted Fever. Outline of a Comprehensive Plan of Treatment with Report of Five Cases. J Amer Med Ass 1947 Apr 5 v 133 No 14 989 94 8 charts (Refs in footnotes)

The author treated five cases of Rocky Mountain spotted fever with para-aminobenzoic acid (PABA) associated with systematic supportive treatment. The results suggested that this line of treatment may practically eliminate deaths from this fearful disease.

The ages of the patients were —17 10 3 4 and 5 years. The youngest children were given 20 gm per kilo body weight daily in two hourly doses. Older children were given half this amount. With each gm of the drug 100 cc of 5.0 per cent sodium bicarbonate was given.

Possible toxic effects are said to be —acidosis leucopenia abdominal distension and delirium. Details are given of the supportive and other ancillary lines of treatment and intravenous injections of dextrose in saline sodium lactate solution plasma and blood were given without hesitation when their use was regarded as being indicated. The combined treatment necessitated the adoption of adequate laboratory studies.

No death occurred and decided curative action was observed in every case.

John H. D. Megaw

150 p 758 HUMPHREYS & CAMPBELL
Surveys in Canada

Plague, Rocky Mountain Spotted

BLANC, G., MARTIN, L. A. & MAURICE, A. Présence du virus de la "Q Fever" dans le Maroc méridional. [The Occurrence of *Rickettsia burneti* in South Morocco.] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 7/8, 138-43, 2 figs. [Refs. in footnotes.]

From ticks identified as *Hyalomma savignyi* the authors have isolated three strains of *Rickettsia burneti*. Suspensions of the infected ticks or of yolk-sac cultures caused reactions in guinea-pigs similar to those caused by strains of American Q fever, and there was complete cross immunity between the American and Moroccan strains, but none between the Moroccan strain and the American of typhus fever, boutonncuse fever, "spotted fever".

The authors state that *Hyalomma* *ph...* *erraticus* can readily be infected.

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The paper includes a concise summary of the literature of Q fever and a useful bibliography. [The authors quote DELRY (*Arch. Inst. d'Hessarek*, 1946, v. 2, 90) who describes *H. Savignyi* (Gervais) as "often identified by the name *H. aegyptium*".] John W. D. Megaw.

HUEBNER, R. J. Report of an Outbreak of Q Fever at the National Institute of Health. II. Epidemiological Features. *Amer. J. Pub. Health.* 1947, Apr., v. 37, No. 4, 431-40, 5 figs. [12 refs.]

Between December 17th, 1945, and May 30th, 1946, an outbreak of 47 cases of Q fever occurred in an isolated laboratory building, which was one of eight separate buildings of the National Institute of Health, Bethesda, Maryland. Work on Q fever had been carried on almost continuously at the Institute since June 1938.

All the cases occurred among persons who had been in the building at some time during the four weeks preceding the onset of their attacks.

The total number of persons who had been in the building during the period was 197, of whom 142 were workers and 55 were visitors. All these persons were studied, and so also were 43 contacts of Q fever patients and 77 workers at the Institute who had never entered the affected building; no cases occurred among the latter two groups.

Among the 142 workers in the building, 59 had been present during an outbreak of the disease in 1940 [see this *Bulletin*, 1941, v. 38, 446, 691]; all the 14 of these who were known to have had attacks in 1940 escaped the disease, and among the remaining 45 only 8 were attacked, whereas among the 82 who had not been present in 1940 there were 36 cases.

Among 20 workers in the building who had been protected against Rocky Mountain spotted fever by a vaccine, only 5 were attacked, and among 62 who had not been thus protected, 31 were attacked. This difference in the incidence suggested that the vaccine may have conferred some degree of immunity.

Among the 55 visitors to the building, 3 were attacked; the incubation periods were 14-16, 17-22, and 28 days respectively. Other evidence suggested that the usual incubation period was 13-18 days.

Workers in all the five floors of the building were attacked, and, strangely enough, the incidence was not highest among the persons most closely connected with work on the disease, but these, with one exception, had been repeatedly vaccinated against Rocky Mountain spotted fever.

The outbreak started shortly after six strains of Q-fever rickettsiae came under investigation involving yolk-sac culture and guinea-pig inoculation. Both in the present and the 1940 outbreak there was a striking degree of association

[August 1947]

Tropical Diseases Bulletin

ALLEJO FREIRE A Spotted Fever in Mexico Immunological Relationship
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John W D Megaw

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John W D Megaw

See also p 758 HUMPHREYS & CAMPBELL Plague, Rocky Mountain Spotted Fever, and Tularaemia Surveys in Canada

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The authors state that *Hyalomma*, *Rhipicephalus sanguineus*, and *Ornithodoros* can readily be infected in the laboratory. A brief account is given of the experimental investigation of the strains. The paper includes a concise summary of the literature of Q fever and a useful bibliography. [The authors quote DELPY (*Arch. Inst. d'Hessarek*, 1946, v. 2, 90) who describes *H. Savignyi* (Gervais) as "often identified by the name *H. aegyptium*".]

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with the preparation of a yolk sac antigen by a process involving high speed centrifugation of suspensions treated with 0.5 per cent formalin. A significant point was that this strength of formalin has not been found lethal to *Q* rickettsiae.

Among 30 guinea pigs kept on one floor of the building 15 were found to have been infected and among 30 on another floor 5 were infected. None of the 132 guinea pigs distributed through the other three floors was infected. Attempts to infect guinea pigs by keeping them in the same cages as infected guinea pigs are said to have failed.

[No conclusion is stated with regard to the manner of transmission of infection, but it is difficult to reconcile the findings in this and other laboratory outbreaks of the disease with any other hypothesis than the inhalation of droplets of infected yolk sac material discharged into the air in the course of processing. The outbreak at Fort Bragg Laboratory for example seems to have been associated with this type of transmission (see this Bulletin 1947 v 44 69).]

John W. D. Megaw

TOPPING N H SHEPARD C C IRONS J V HOOPER J M MURPHY
J N WOLFE D M COX H R TESAR W C Q Fever in the
United States I—Epidemiologic Studies of an Outbreak among Stock
Handlers and Slaughterhouse Workers [TOPPING SHEPARD & IRONS]
J Amer Med Ass 1947 Mar 22 v 133 No 12 813-15 II—Clinical
Data on an Outbreak among Stock Handlers and Slaughterhouse Workers
[IRONS & HOOPER] *Ibid* 815-18 5 figs III—Serologic Observations
in an Outbreak among Stock Handlers and Slaughterhouse Workers [IRONS
MURPHY & WOLFE] *Ibid* 819-20 IV—Isolation and Identification of
Rickettsias in an Outbreak among Stock Handlers and Slaughterhouse
Workers [COX TESAR & IRONS] *Ibid* 820-21 [Refs in footnotes]

In these four papers different aspects of an explosive outbreak of *Q* fever are described. Altogether 55 cases occurred in March 1946 among 136 persons more or less closely associated with the handling of cattle in Amarillo Texas. There were two deaths.

I The first paper deals with a careful epidemiological study from which it appears that the source of infection was a group of 41 apparently healthy cattle that arrived at a stock yard on February 23rd. The first case occurred on March 10th and the others followed in quick succession during the next few days. There was no evidence of transmission by ticks and it was thought that infection may have been by dust [presumably by inhalation] derived from material contaminated by the excreta of the infected cattle.

II The second paper contains clinical data based chiefly on the observation of 18 patients treated in hospital. The clinical picture was extremely varied ranging from subclinical attacks and mild influenza like illnesses to fatal attacks of which there were two.

The onset was usually rapid with headache chills and malaise. The duration of the fever in hospital cases ranged from 7 to 19 days except in one case in which it was 43 days. Neuralgic pains in the chest occurred in more than half the cases. Cough usually non productive was not infrequently observed. X ray findings which usually revealed the presence of lesions such as occur in atypical pneumonia pneumonitis or early pneumonia.

Leucocyte counts various agglutination tests and blood cultures gave negative results. Convalescent sera of patients gave complement fixation and rickettsia agglutination reactions against *Q* fever antigens. Convalescence was

Dengue and Allied Fevers.

usually uneventful, but in three cases it was prolonged by pleural effusion. Autopsies were not performed in the two fatal cases.

No definite rash was seen in any of the cases.

III. The third paper deals with the serological findings, especially the complement-fixation tests. With Q-fever antigens, rising-titre fixation occurred the average maximum titre, reached about the 4th or 5th week, was 1-320.

IV. In the fourth paper an account is given of the isolation of *Rickettsia burneti* from the sera of two patients. DBA (dilute brown agouti) mice were inoculated with 0.5 cc. of a 1-10 dilution of the patient's serum; no evidence of infection was observed after the original intraperitoneal inoculation, but 10 per cent. suspensions of the spleens of these mice, killed seven days after inoculation, were used for transfers, and strains of the organism were isolated from the enlarged spleens of mice of the second and third passages.

Yolk-sac cultures were readily obtained. Passages through albino Swiss mice and guineapigs were also successful.

John W. D. Megaw.

DENGUE AND ALLIED FEVERS.

FLEMING, J., BIGNALL, J. R. & BLADES, A. N. Sand-Fly Fever. Review of 664 Cases. *Lancet*. 1947, Apr. 5, 443-5. [11 refs.]

In Rome and Naples during 1944 and 1945, the authors have studied 664 cases of fever which "satisfied the rather ill-defined criteria for the diagnosis of sand-fly fever."

The cases conformed to the usual clinical pattern of the disease, but during the outbreaks, especially those in Naples, *Phlebotomus papatasi* were scanty, whereas other biting insects—*Culex* mosquitoes and *Stomoxys calcitrans*—were much more plentiful.

The blood findings were not found helpful in differentiating the disease from other virus infections such as atypical pneumonia and the pre-icteric stage of infective hepatitis. There was stiffness of the neck in 121 cases, vomiting in 116, photophobia in 55, and chest pain resembling pleurodynia in 7.

A rash was seen in 95 cases on the first day of the illness; this is described as:—"macular, 30; urticarial, 5; petechial, 20, and herpes labialis, 40."

John W. D. Megaw.

ANDERSON, W. M. E. Sand-Fly Fever. [Correspondence.] *Lancet*. 1947, May 3, 613.

The author sharply criticizes the suggestion of FLEMING *et al.* [above] that any blood-sucking insect may act as a vector of sandfly fever; on the evidence offered he regards this hypothesis as unsubstantiated.

He also finds the observations on symptomatology as unsatisfying, and refers to his own paper in which the diagnosis was confirmed by SHORTT, who cultured the virus on egg membrane [see this *Bulletin*, 1942, v. 39, 155].

John W. D. Megaw.

FLORIO, L. & STEWART, Mabel O. Colorado Tick Fever. *Amer. J. Pub. Health*. 1947, Mar., v. 37, No. 3, 293-7, 3 figs. [12 refs.]

A general description—see this *Bulletin*, 1945, v. 42, 118-19.

DE BOER C J KUNZ L J KOPROWSKI H & COX H R Specific Complement-Fixing Diagnostic Antigens for Colorado Tick Fever. *Proc Soc Exper Biol & Med* 1947 Feb v 64, No 2 202-8 [14 refs]

Colorado tick fever is now recognized as a virus disease presumably tick borne quite distinct from Rocky Mountain spotted fever and dengue, though resembling the latter disease both clinically and haematologically [also in

ed from the brains with three strains of infectious mouse brain suspensions Two of the strains had been passed repeatedly through the brains of hamsters and mice the third had been passed through the brain of a dba (dilute brown agouti) mouse and then through the brains of 10 Swiss albino mice

Immune serum was obtained from hyperimmunized mice and several samples of human sera were obtained from patients

Details of the technique and references to previous work on the disease will be found in the paper

With the antigen mouse immune serum gave complete fixation at a titre of 1-30 the same serum gave completely negative responses with other virus antigens including various strains of equine encephalomyelitis and also with rickettsial antigens including murine typhus Rocky Mountain spotted fever, and American Q fever though all these antigens reacted well with their homologous sera

With human sera from Colorado tick fever patients complement fixation and mouse-neutralization tests gave positive results in one case as early as the 9th day in another as late as 34 months after recovery

With human syphilitic sera the antigens yielded no false positives

John W D Megaw

PLAGUE

PUBLIC HEALTH REP Wash 1947 Mar 21 v 62 No 12 431-3 Plague Infection reported in the United States in 1945

Sampling surveys of infection in rodents and ectoparasites No human case was reported during 1945

BAKER E E SOMMER H FOSTER L E MEYER E & MEYER K F Antigenic Structure of *Pasteurella pestis* and the Isolation of a Crystalline Antigen *Proc Soc Exper Biol & Med* 1947 Feb v 64 No 2 139-41

This is a very condensed note and is therefore difficult to summarize but the subject matter is to be dealt with in full detail later Dried bacilli of the Yreka strain were grown for 3 days on agar at 37°C when the growth was suspended in normal salt solution precipitated and repeatedly washed with

division in normal salt solution at 37°C it is surmised that IB a carbohydrate-free crystalline protein may be an artefact and that IA the carbohydrate protein fraction is the normal antigen of the intact cell Both IA

and IB are "envelope" antigens. The author considers that "in view of the observed differences in response of the various laboratory animals to the different antigens of plague bacilli, it is advisable at the present time to use vaccines containing all of the antigens of *P. pestis* for prophylaxis of plague in man and for the production of antiplague serum." W. F. Harvey.

HERBERT, D. Streptomycin in Experimental Plague. *Lancet*. 1947, May 10, 626-30, 3 figs. [39 refs.]

Streptomycin, as the possible rival to sulphonamides and penicillin, is receiving much experimental attention. The results here given, even with a disclaimer that they are not optimal, are very detailed. It would appear that, *in vitro*, streptomycin is not merely bacteriostatic, but bactericidal; acts on Gram-positive, Gram-negative and acid-fast organisms; is comparatively non-toxic to animals and man and, having proved effective in tularaemia, is also found to be effective in experimental plague. It would seem, moreover, that *Past. pestis* is more sensitive to all three test substances, sulphanilamide, sulphathiazole and penicillin, than most Gram-negative organisms are reported to be. The two highly plague-susceptible animals, mice and guineapigs, and both virulent and avirulent (Tjiwidej) strains were used in these experiments. A sufficient dosage was employed to kill 100 per cent. of the control animals.

This important work is summarized.—Streptomycin in concentrations of 3 units/ml. brings about rapid sterilization of plague cultures. In mice infected subcutaneously with a highly virulent strain . . . 2½-day courses (800 units/day) started 0, 24 and 48 hours after infection gave 85 per cent., 60 per cent. and 5 per cent. survival. . . . In guineapigs, 3½-day courses (40,000 units/kgm./day) gave 100 per cent. survival even when dosage was delayed for 48 hours after infection. "Streptomycin is equally effective in the treatment of artificially induced pneumonic plague in both mice and guineapigs. . . . In comparative tests in infected mice, however, streptomycin was considerably more effective than sulphathiazole, and penicillin was only slightly effective, even in very high dosage." Treatment begun at 0 hours may be regarded as semi-prophylactic, and treatment 72 hours after infection gave no survivals and was, therefore, ineffective, "though survival was significantly prolonged" W. F. Harvey.

MACCHIAVELLO, A., MOSTAJO, B. & MOSTAJO, B., Jr. Control de una epidemia de peste bubónica con DDT y "1080". [Plague Control in Peru with DDT and "1080".] *Bol. Oficina Sanitaria Panamericana*. 1946, Dec., v. 25, No. 12, 1097-1100. English summary.

In 1945, an epidemic of plague occurred in the city of Tumbes, Peru, which has 10,000 inhabitants. Forty cases occurred, with 14 deaths.

There were 21 foci, in which 27·3 per cent. of the rats found, and 56 per cent. of their fleas, were infected with plague.

DDT powder (diluted to 10 per cent. in talc or pyrophyllite and 2-5 per cent. in refined wheat flour) was applied to floors, walls and ceilings. Sodium fluoracetate (1080) was then applied.

The epidemic ended 4 days after the first application of DDT was completed: fleas, on rats or in their nests, were reduced by about 85 per cent., and fleas throughout the foci were finally reduced by over 90 per cent.

Plague in the rats was reduced by 75·6 per cent. after the first application of DDT and was eradicated completely after the second.

The use of 1080 was most effective for example in one part of the city 40-4 rats per 100 baits were killed as were 1-2 rats per house

H J O D Burke Gaffney

See also p 758 HUMPHREYS & CAMPBELL Plague, Rocky Mountain Spotted Fever, and Tularemia Surveys in Canada

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ALBRIGHT E C & GORDON E S Present Status of the Problem of Amebiasis
Arch Intern Med 1947 Mar v 79 No 3 253-71 [Refs in footnotes]

A review of the epidemiology pathology diagnosis and treatment

MURRAY LYON R M The Aetiology and Diagnosis of Amoebiasis *Edinburgh Med J* 1947 Feb v 54 No 2 65-75 [24 refs]

CAMERON J D S Amoebiasis *Ibid* 76-89 6 figs on 1 pl & 4 text figs [20 refs]
Useful summaries for the medical practitioner

GREIF R L Agglutination of *Endamoeba histolytica* Cysts *Amer J Trop Med* 1947 Mar v 27 No 2 131-4 2 figs

The author cites a number of workers including HEATHMAN [this *Bulletin* 1933 v 30 25] who have used the agglutination reaction in the study of free living amoebae

In the present study an attempt was made to find agglutinins for cultured cysts of *E. histolytica* in the sera of carriers

Cyst suspensions were made from the NRS strain of *E. histolytica* grown on coagulated egg medium the technique of preparing the suspensions is described

Inactivated sera from persons suspected of being infected with *E. histolytica* were tested with the cyst suspensions so also were fresh sera picked at random and horse serum For testing the sera were mixed on a well slide the slide was placed in a dish and incubated for 1-2 hours at 37°C with gentle agitation every 15 minutes Saline and positive sera controls were included Before microscopic examination the sera were centrifuged for 8 to 10 hours to micrographs in dilutions of serum from man and horse there appeared to be no correlation between agglutination and infection with *E. histolytica* nor was the agglutination related to complement fixation

The results are shown in a table indicating that the agglutinins are contained in the gamma globulin fraction agglutinated 24 hours after incubation

A plea is made for the use of the agglutination reaction in the diagnosis of amoebiasis

H J O D Burke Gaffney

CARRAUD, G. Comment peut se poser le diagnostic de l'amibiase intestinale ? [The Problem of diagnosing Intestinal Amoebiasis.] *Schweiz. med. Woch.* 1947, May 10, v. 77, No. 19, 532-3.

An account of 3 atypical cases, with observations on diagnosis.

ROSENSTIEL. Considérations sur l'amibiase chronique et son traitement. [Chronic Amoebiasis and its Treatment.] *J. Méd. de Bordeaux.* 1947, Apr., v. 124, No. 4, 159-61.

A discussion on diagnosis and treatment.

PADRON IBARRIA, F. Granuloma inflamatorio del ciego de origen amebiano. [Amoebic Granuloma of the Caecum.] *Salud y Beneficencia Municipal.* Habana, Cuba. 1946, Jan-Dec., v. 6, No. 1, 38-41, 2 pls.

MOHAPATRA, G. S. Diagnosis of Presumptive Amoebic Hepatitis in a Child Aged Two Years. *Indian Med. Gaz.* 1947, Jan., v. 82, No. 1, 24-5.

The case was diagnosed clinically and responded to emetine.

EDWARDS, M. L. Amoebic Pericarditis. *Med. J. Australia.* 1947, Feb. 8, v. 1, No. 6, 177-8.

The author refers to Editorial comment in the *Med. J. Australia*, of February 2nd, 1946, on the rarity of amoebic pericarditis, the comment arising out of the case diagnosed at autopsy by KERN [this *Bulletin*, 1946, v. 43, 42].

He then describes the clinical record of a patient seen by him, who had served in the Middle and the Far East. He was admitted to hospital in New Guinea on May 10th, 1945, complaining of subcostal pain on the right side, aggravated by deep breathing, and passing to the neck: the pain had been present for a week. No significant changes were noted on careful investigation, other than a hookworm infestation, which was treated.

The patient's symptoms persisted and, on May 19th, a pericardial rub was heard over the base of the heart, down to the fourth left intercostal space: this persisted until May 27th. On June 2nd, the persistent pain in the right hypochondrium began to radiate to the right shoulder. The liver was not palpable. Full clinical, laboratory and X-ray examinations were made, but were not significant.

The patient was seen by the author on the mainland on June 26th, and felt much more comfortable after 6 weeks' rest. Further full investigation revealed little of significance.

Symptoms of diaphragmatic irritation, however, gradually increased. An X-ray film of the chest on July 18th showed a localized rounded elevation of the diaphragm on the right side, just lateral to the cardio-phrenic angle. Leucocytes were now 10,000 per cmm. with 66 per cent. neutrophils and 6 per cent. metamyelocytes.

Despite the absence of amoebae or cysts, a course of emetine was given empirically: this consisted of 1 grain of the hydrochloride intramuscularly daily for ten days, from July 20th, followed by routine E.B.I. and carbarsone. On July 23rd, the patient developed a cough with frothy, purulent, blood-stained, copious sputum: microscopic examination showed no significant elements. Signs of patchy consolidation of the right lung, with pleural friction and frequent râles now developed: this condition responded to sulphadiazine and on July 30th, symptoms had greatly diminished. On August 9th, the patient felt well and further convalescence was uneventful.

A further X-ray in the beginning of August showed elevation of the right side of the diaphragm in the middle of its leaf: there was an area of opacity in

[August 1947]

the lung field at the base of the right lung overlying this elevation with increased vascular markings running to the right hilum. The appearances were consistent with a rupture through the diaphragm which had left a residual pneumonia and adherent pleura.

The author has little doubt on clinical grounds that the case was one of amoebic abscess of the liver rupturing spontaneously through the diaphragm. The chief interest lying in the early persistent pericardial friction which was the only evident clinical abnormality at the time.

[A case of amoebic pericarditis responding to emetine was recently reported by LAHA in India this Bulletin 1947 v 44 585]. This case like that of Kern and of the present author was secondary to an amoebic hepatitis in each case diagnosis was made either on the general clinical or post mortem picture or the response to emetine or both. In none was the causative organism found during life. The present author rightly summarizes the pericardial manifestations as evidence of a pericardial reaction to the underlying amoebic infestation of the liver. Such a guarded description as pericarditis associated with amoebic hepatitis is indeed perhaps more accurate than the generalization of amoebic pericarditis. The real lesson to be learnt from these interesting records is the need to consider the possibility of amoebic infection when faced with a combination of pericarditis with pain in the right shoulder and hypo chondrium painless enlargement of the liver and radiological evidence of localized diaphragmatic elevation.

H J O D Burke Gaffney

CARINI A. Mass um caso de amebiose cutanea implantada na ferida cirurgica da abertura de um abscesso hepatico [A Case of Cutaneous Amoebiasis Implanted in the Surgical Wound of a Liver Abscess] Reprinted from *Arquivos de Biol* 1939 Mar v 23 No 214 2 pp 1 fig

RANSON G W & HITCHCOCK Dorothy J. An *in vitro* Method of testing the Amoebicidal Action of Chemical Agents J Parasitology 1947 Feb v 33 No 1 19-24

In testing amoebicidal drugs *in vitro* cultures of *E. histolytica* with a mixed bacterial flora were exposed to serial dilutions of 52 drugs mostly arsenicals for a period of 24 hours at 37°C with all the usual precautions. Comparable tests were made under slightly different conditions with another strain of the amoeba grown with a liquid portion of liver extract in saline. The drugs were egg slant with a liquid portion of the liquid portion and the pH was adjusted to between 7.0 and 7.5. Insoluble compounds or those whose solutions lie outside the above pH range are not suitable for test by this method. The drugs in solution were added in different dilutions to tubes containing *E. histolytica* cultures 48 to 72 hours old and incubation was carried out for 24 hours. Examination was then made for the presence of motile amoebae the highest drug dilution at which they were seen being considered as the end point. When the results were doubtful sub-cultures were made. The tests with the two different organisms gave fairly consistent results. Stovarsol, carbarsone and chumofon did not give results as favourable as those shown by some other compounds which have not yet been tested clinically. Further tests are therefore necessary before these qualitative results can be assessed.

[The concentrations at which some drugs proved effective are higher than those found in similar experiments by the reviewer. This may be explained partly by the fact that the drugs were allowed to act for 24 hours only and partly because the culture medium contained a solid portion which was shown many years ago to absorb added drug. Filtration of drug solutions through a Seitz filter which was done in some cases would also reduce the concentration of those having adsorptive properties.]

J D Fulton

VALDIVIA PONCE, O. Parasitismo intestinal en la provincia de Islay. [Intestinal Parasitism in the Province of Islay.] *Crónica Méd.* 1946, July, v. 63, No. 997, 175-9.

The high rate of infestation with intestinal parasites in the province of Islay, Peru, is, as the author states, evidence of "the wretched sanitary conditions existing there".

Some 500 stool examinations were made in 3 districts of the Province, and the results of each are shown separately. For the Province as a whole, protozoal infections predominated, the pathogenic amoebae accounting for 66 per cent. of the total number of parasites: helminths amounted to about 12 per cent., and over 8 per cent. of parasites found were *Hymenolepis nana* infections. Over 80 per cent. of the stools were positive, and all but 10 per cent. of them were in children of school-age. Protozoal infestations predominated at the Coast, and helminthic were commoner up-country. *H. J. O'D. Burke-Gaffney.*

ZEPEDA, J. E. Incidencia de los principales protozoarios intestinales en la ciudad de Tegucigalpa, D.C., Honduras. [Incidence of the Principal Protozoan Intestinal Parasites in Tegucigalpa.] *Rev. Med. Trop. y Parasit.* 1946, Oct. & Dec., v. 12, No. 4, 108-9, 1 chart.

The incidence of *Entamoeba histolytica*, *Trichomonas hominis* and *Giardia intestinalis* in the city of Tegucigalpa, D.C., Honduras, is more or less evenly endemic throughout the year.

In 1944-45, the author examined 21,125 stool specimens in the Central Public Health Laboratory, and found the incidence of these three protozoa to be respectively 30.28, 16.62 and 5.41 per cent. These results were obtained from examination of a single specimen in each case, and are therefore regarded as high, since sanitary conditions in Tegucigalpa are much better than in other parts of the country.

H. J. O'D. Burke-Gaffney.

PAYZIN, S. *Lambliia intestinalis* ve *trichomonas intestinalis* ile yaz ishalleri arasinda ilgiler. [The Relation of Summer Diarrhoea to the Presence of *Giardia* and *Trichomonas* in the Stools of Children.] *Türk Hıfzissihha ve Tıbbi Biyoloji Mecmuası.* (Rev. Turque d'Hyg. et de Biol. Exper.). Istanbul. 1944, v. 4, 69-79, 3 figs. French summary 80.

In the summer of 1944, the author frequently found *Trichomonas hominis* and *Giardia intestinalis* in routine stool examinations. these had not been observed in the previous year.

During 1944, among 227 faecal examinations, 60 of which were from children, a total of 30 stools contained protozoa: all of these were from children. In 3 cases, both protozoa were present together, and in two others, *Entamoeba coli* was present in addition to one of these protozoa. From two stools, not containing protozoa, *Shigella* organisms were isolated.

Those stools which contained the protozoa were fermented and had a foetid odour. . . . bacteria. All patients affected

intestinal protozoa should not be omitted in the presence of outbreaks of summer diarrhoea.

H. J. O'D. Burke-Gaffney.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

COGHILL N F LAWRENCE J & BALLANTINE I D Relapsing Fever in Cyrenaica *Brit Med J* 1947 May 10 637-40 2 charts [89 refs]

A description of the clinical features of four cases of relapsing fever seen in Cyrenaica at 82 General Hospital Benghazi followed by a discussion of the relevant literature especially the Italian

Before the war Italian workers claimed to have identified three possible local carriers —*Ornithodoros foleys* Parrot (syn *O franchinus* Rondelli) *O moubata* and *O sanguis* Audouin Recently ADLER and THEODOR [personal communication to the authors] have identified ticks from Tobruk and the Egyptian western desert as *O tholozani* Laboulbène and Mègnin The single Tobruk specimen was found to be naturally infected with relapsing fever spirochaetes
E Hindle

RAYNAUD R AUBIN H & PEGULLO J Syndrome de Guillaïn et Thaon post-récurrentiel chez un indigène algérien [Guillaïn and Thaon Syndrome following Relapsing Fever in an Algerian] *Algérie Méd* 1947 Feb No 2 150-51

Report of a case

MARIA GUERRERO J Tratamiento de la fiebre recurrente por medio de la penicilina [Treatment of Relapsing Fever by Penicillin] *Rev Facul de Med Bogotá* 1946 Oct v 15 No 4 264-5

A case in an infant of 2 months who received 20 000 units every three hours the temperature fell on the second day and the child made an uninterrupted recovery

H J O D Burke Gaffney

LEVADITI C & VAISMAN A Action de la pénicilline sur le virus récurrentiel résiduel névralgique [Action of Penicillin on Residual *Trep duttoni* Infection in the Central Nervous System] *C R Soc Biol* 1946 Jan v 140 Nos 1/2 29-30

Relatively small doses of penicillin administered intracerebrally in mice with long standing *Trep duttoni* infections destroyed the residual infection in the central nervous system although quantities ten times greater proved ineffective in this respect when given subcutaneously

H J O D Burke-Gaffney

LEVADITI C VAISMAN A & NOURY H Syphilis et infection récurrentielle [Syphilis and Relapsing Fever] *C R Soc Biol* 1945 Nov v 139 Nos 21/22 972-4

Summary

the distribution of virulent

latent syphilitic infections

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either in the sites of election or in the central nervous system

H. J O D Burke-Gaffney

YAWS.

GUIMARÃES, F. N. Manifestações bombáticas discrômicas simulando pinta ("carate, mal del pinto, purú-purú"). [Dyschromic Yaws Lesions simulating Pinta.] *Brasil-Médico*. 1947, Mar. 22 & 29, v. 61, Nos. 12/13, 81-7, 2 figs. [21 refs.]

[An article of much interest on a subject meriting discussion by medical men from all parts of the tropics, but one which poses a problem soluble only after considerable further research.]

In a low-lying riverine district of Rio de Janeiro where the people live in primitive dwellings, the Oswaldo Cruz Institute established a post in 1945 for the study of yaws and its treatment by penicillin. Some 800 patients were dealt with. Among these were seven, whose cases are detailed, who presented symptoms regarded elsewhere as those characteristic of pinta: achromic and dyschromic patches on exposed parts, especially the hands, arms and feet, starting as erythematous or squamous papules, not as ulcers, followed in 5-12 months by secondary maculae and papules ("pintids"), with a positive Wassermann reaction, with juxta-articular nodules in two cases, ainhum in one; all were negroes. Treatment with penicillin brought about a weakening to actual reversal of the W.R., improvement of symptoms, reduction to disappearance of the J.A.N. The penicillin was given by injection in two courses; the first in doses of 2,000 Oxford units thrice daily, the second, after an interval of 6-9 weeks, with double the dosage. In two cases of those detailed, the first course was for 10 days, the second for 14 days. [The question open to discussion is whether the lesions are due to a team of workers is: Is the connexion between yaws, syphilis, pinta, and bejel?] H. Harold Scott.

LEPROSY.

BRITISH MED. J. 1947, May 24, 731. Leprosy in Britain.

Six cases of leprosy occurring in Britain in persons returned from the Far East are described. Two of them were early tuberculoid cases, diagnosed clinically and from the presence of anaesthesia. no *Myco. leprae* were found. Another was an advanced case, with infiltration of the face, patches on the body, and nerve lesions. *Myco. leprae* was found in scrapings from the corium. The need is stressed for keeping a diagnosis of leprosy in mind where resistant skin lesions of long duration are met with in persons who have been in countries where leprosy is endemic. Early lesions may be mistaken for ringworm, and anaesthesia should be looked for.

The importance of early diagnosis and treatment is obvious.

H. J. O'D. Burke-Gaffney.

DE SOUZA-ARAÚJO, H. C. O problema da lepra na America do Sul. [The Leprosy Problem in South America.] *Mem. Inst. Oswaldo Cruz*. 1945, v. 43, No. 3, 583-98, 2 figs. [20 refs.]

CANAAN, T. Immigration and Leprosy. *J. Palestine Arab Med. Ass.* 1947, Mar., v. 2, No. 3, 72-8. [11 refs.]

RYRIE G A Some Impressions of Sungei Buloh Leper Hospital under Japanese Occupation *Leprosy Review* 1947 Jan v 18 No 1 10-17

to 660 and the children from 265 to only 21. The high death rate was due to famine concurrent disease and deprivation of anti leprosy and other drugs.

septic complications proved fatal and malignant tertian malaria cases often ended in fatal cerebral complication. Hydnocarpus oil also ran very short with the result that the peace-time annual discharge rate of 150-200 patients cured in the clinical sense fell to nil. The most interesting observation was that within three or four months after the introduction of injections of 1-5 000 solution of potassium permanganate for want of anything better the patients were unanimous in declaring that the new treatment was useless and in demanding the restitution of Hydnocarpus oil. After making all allowances for malnutrition the author concluded that when all criticisms are conceded these years convinced me as nothing else has done of the real (I avoid the word 'specific') value of Hydnocarpus oil. L Rogers

MACRAE A G Notes on Leprosy Settlements Tanganyika Territory *Leprosy Review* 1947 Jan v 18 No 1 23-30

In dealing with the scattered foci of leprosy in the enormous area of these territories the author points out the advantages of several comparatively small provincial leprosy settlements over a single very large one. The task is simplified by the fact that only 5-10 per cent of cases in Central Africa are lepromatous, 15 per cent mixed and 75-80 per cent neural. The neural type may for all practical purposes be regarded as non-infective and hence does not require isolation. In the Makete Settlement the incidence of leprosy in the children of infected parents is surprisingly low. The average population is about 1 500 and new patients construct their own houses. Each patient has a minimum of five acres of land so that after the first year the patients are self-supporting. Occupational therapy is encouraged to produce for the needs of the settlement. A good water supply is essential. Admissions are voluntary so the settlements must be made attractive. Conjugal infections are very rare and therefore separation of husband and wife is rarely necessary, but any children born to them should be sent to relatives before they are six months old. L Rogers

WHARTON L H Leprosy Survey of School Children in British Guiana *Leprosy Review* 1947 Jan v 18 No 1 30-33

It is recognized that infection of children is the key to the leprosy problem; this is the first survey of school children in British Guiana to be reported. A total of 42 811 children with approximately equal numbers of boys and girls examined revealed 94 infections: 48 boys and 46 girls, an unusually large incidence among females. No less than 91 were early neural cases which were treated at out-patient clinics. 1 was lepromatous and the remaining 2 were more advanced neural cases. The entire coastal area which contains 90 per cent of the whole population was surveyed in the course of 18 months. Most of the cases were in children between 6-10 years of age. Two teachers were also infected. All the Government schools were visited and it is proposed to

examine the children in secondary and denominational schools at the next survey. It has not yet proved possible to examine the contacts of the cases discovered. Definite progress has been made in convincing the public that the disease can be cured, "and the remarkable results obtained in children treated as out-patients has been proof of this."

L. Rogers.

BURDON, K. L. Disparity in Appearance of True Hansen's Bacilli and Cultured "Leprosy Bacilli" when Stained for Fat. *J. Bacteriology*. 1946, Dec., v. 52, No. 6, 679-80.

The author has studied, by means of his improved Sudan black B fat-staining procedure, both true Hansen's bacilli in films from cases of leprosy and cultured acid-fast organisms claimed to be those of leprosy. Heat-fixed films of leprosy material were stained with dilute carbol fuchsin only and characteristic clumps and globi of lepra bacilli located and ringed. After removing the immersion oil with xylol, Sudan black B solution was applied for 15 minutes or longer, and some of the films counterstained with dilute carbol fuchsin. The ringed organisms were then examined for evidence of stained intracellular lipid. The important observation was thus made that in the case of both tubercle bacilli and also in various cultured "leprosy bacilli", stainable lipid was constant and prominent, but no intracellular fatty material was observed in any films of true Hansen bacilli. Moreover, human tubercle bacilli in direct preparations from tuberculous tissues, as well as in most cultures, do contain matter which stains with Sudan black B. He suggests that his observations lend support to the view that the various acid-fast bacilli, which have been cultivated from leprosy tissues from time to time, are not those of leprosy, but are saprophytic acid-fast bacilli, others of which also contain lipid staining particles.

L. Rogers.

HANKS, J. H. A Study of the Bacilli in Tissue Cultures of Lepromata in Serum Media. *Internat. J. Leprosy*. Cleveland, Ohio. 1947, Jan.-Mar., v. 15, No. 1, 21-30, 1 fig. [13 refs.]

This is the first of an important series of tissue culture experiments by this worker with quantitative control of the number of lepra bacilli. In an earlier paper [see this *Bulletin*, 1947, v. 44, 323] he described quantitative methods to determine if lepra bacilli had actually multiplied or not in certain culture media, and concluded that they had not. These methods have been used in the present experiments to examine the behaviour of leprosy bacilli in tissue cells maintained by *in vitro* cultivation. Those interested should refer to the

only, but the bacilli-laden macrophages were unable to migrate into the plasma and the spread of cell suspensions from the fresh nodule showed only moderate numbers of free bacilli or globi. In sections, macrophages with many bacilli were recognizable, but fibroblasts contained few, if any organisms. After sixteen days, only fibroblast cells were present, and numerous bacilli were present in the plasma. The total number of bacilli in the plasma was not due to the presence of numerous bacilli, as is held by some previous workers, and no evidence of bacillary growth was obtained.

L. Rogers.

HANKS J H The Fate of Leprosy Bacilli in Fibroblasts cultivated from Macular and Tuberculoid Lesions *Internat J Leprosy* Cleveland Ohio 1947 Jan Mar v 15 No 1 31-47 3 figs [13 refs]

This paper deals with tissue cultures of macular and tuberculoid leprosy on similar lines to the above work. In this class of lesions lepra bacilli are few and the patients' tissues are more resistant to them so it should prove easier to decide if any increase in the numbers of organisms takes place in tissue cultures. A crucial test was based on cutting the new cell growth away from the original bacillated explants in order to learn whether the bacilli persisted or increased in successive sub-cultures. For this purpose the serum media were

early but soon disappeared. Serum media also maintained fibroblasts from tuberculoid lesions for about a month. The addition of embryo juice restrained the multiplication of fibroblasts which grew to a large size and these tolerated lepra bacilli but in active cultures the bacilli were not well tolerated and were rapidly digested by them. After six to twelve weeks both intra and extra cellular bacilli began to show evidence of autolysis or extraction; single bacilli became difficult to find and clumps were pale and lused.

The tedious method of counting bacilli in cultures from macular lesions revealed that the maximum number of intracellular bacilli occurred in early samples of cells when portions of the original explants were present in cultures. This phenomenon is attributed to delayed transport of the bacilli from the primary explants. Any tendency towards a rising proportion of cells with bacilli for a time was reversed after 12 weeks and the bacilli had disappeared almost entirely by the end of six months as shown by comparing the bacilli during early stages of cultivation with those present after intervals of three to six months. A third method was to rely on non proliferating control particles such as pigment granules as an indication that cells containing bacilli after the longest intervals were likely to contain material from the original explants.

The advancing border of tuberculoid lesions created a stronger impression of viable leprosy bacilli than did any other form of leprosy but only in primary cultures from the papillary layer of the skin which remained almost stationary in size. Enhanced destruction of bacilli was observed with greater degree of cell activity. In one experiment fibroblasts free from bacilli were infected with bacilli from a nodule; they were promptly phagocytosed and destroyed by multiplying fibroblasts from these clinically resistant forms of leprosy.

L. Rogers

HANKS J H The Fate of Leprosy Bacilli in Fibroblasts cultivated from Lepromatous Lesions *Internat J Leprosy* Cleveland Ohio 1947 Jan Mar v 15 No 1 48-64 6 figs

The evidence accumulated in the previous paper that the occasional bacilli found in cultures after six months were usually associated with pigment granules from the explanted skin led the author to repeat tissue cultures of

It was found that in all media the most heavily infected cells contained unusual amounts of carbon, the two being found together in some particular portion of the cytoplasm. Dividing cells always showed particles around the nucleus, so they were equally divided between the daughter cells. High bacillary content in original explants was usually associated with high cell content, so that large numbers of bacilli were carried into the growth zone, and decreasing bacillary concentrations were revealed during continuous growth. The presence of embryo-juice in serum media enhanced the early growth of bacillus-containing cells, which also included many carbon particles. After several weeks, most bacilli were found in cells of luxuriant growth, but which soon "stalled" at 30°C.; but no cells with low incidence of bacilli returned to a heavily-bacillated condition. It was eventually found that the fate of the bacilli was similar to that of the accompanying carbon particles, except that the bacilli were less durable. No evidence was obtained that carbon particles were unfavourable to the bacilli, for the bacilli disappeared at about the same rate whether carbon was present or not.

of bacilli in cultivated fibroblasts. The internal organs are characterized by higher cell populations, a greater incidence of mitotic cells, a more active metabolism and a lower pH than that of the peripheral tissues. In tissue cultures, modification of the growth-rate and the pH permits the physiological conditions to vary along similar lines with corresponding effects. *L. Rogers.*

HANKS, J. H. The Question of Free Bacillary Growth in the Plasma surrounding Lepromatous Explants during Tissue Cultivation. *Internat. J. Leprosy.* Cleveland, Ohio. 1947, Jan.-Mar., v. 15, No. 1, 67-9.

In this note, the author discusses the true nature of the turbidity of the plasma surrounding lepromatous tissue cultures, which some workers have taken as evidence of the multiplication of free bacilli. He attributes any apparent increase of bacilli to early cell outgrowth of fibroblasts containing them, and not to multiplication. The turbidity of the plasma is due to calcification.

L. Rogers.

HANKS, J. H. The Influence of Carbon Particles on the Development of Rat Leprosy. *Internat. J. Leprosy.* Cleveland, Ohio. 1947, Jan.-Mar., v. 15, No. 1, 65-6.

This note reports experiments to ascertain the effect of carbon from India ink on induced leprosy infection introduced into rats. Inked rat-lepromata were embedded in one flank of four rats, and white control explants in the other flank. After slight delay in development of the black explants after three months, the degree of infection on the two sides was indistinguishable. In ten more rats, approximately 35,000 bacilli suspended in India ink were injected under the skin of the left shoulder, and the same dose in saline on the opposite side. After three months, there were a few bacilli on the carbon side, but after six months the two types of lesions were practically similar and carbon particles had not prevented cells from becoming stuffed with lepra bacilli. Finely dispersed carbon particles afford a useful control substance in experiments on the multiplication of the micro-organisms. *L. Rogers.*

HANKS J H Attempts to infect Chick Embryos and Chick Tissue Cultures with Bacilli from Human Lepromatous Lesions *Internat J Leprosy* Cleveland Ohio 1947 Jan-Mar v 15 No 1 70-77 [18 refs]

This paper reports attempts to establish experimental infections of leprosy bacilli from lepromatous nodules in chick embryos and chick tissue cultures in view of the remarkable series of successful cultures of viruses etc. by that method. On account of the relatively short incubation period before hatching of the chicks the lepra bacilli were injected into the yolk sac so as to be distributed throughout the embryo. In 24 experiments with incubation at 34° and 37°C observations made failed to suggest that the bacilli were collected preferentially or were growing in any organ or tissue. Chick tissue cultures of leprosy bacilli were next tried and maintained for long periods in the original vessels on media containing chick serum or fresh or pasteurized embryo juice at different temperatures and with varying periods between renewals of the media. Successful chick tissue cultures were obtained with good growth of fibroblasts a few of which might contain one or two bacilli. Carbon particles were also injected into embryonic breast muscle before preparing the explants to allow the response of both macrophages and fibroblasts to the bacilli to be observed. The tissue cultures lived longer at room than at higher temperatures. After 31 days the ratio of bacilli to carbon appeared to be lower. bacilli paler and clumps less distinct and in subcultures no bacilli were found at the end of four months. No signs of bacillary proliferation were observed in any of the tests but a decreasing incidence or actual disintegration of the bacilli was usually observed. The results were therefore negative.

FLOCH H & DE LAJUDIE P Sur la transmission de la lèpre par les arthropodes (The Transmission of Leprosy by Arthropods) *Institut Pasteur de la Guyane et du Territoire de l'Inini* Publication No 138 1946 Oct 3 pp [10 refs]

The author discusses the varied results of the many attempts to transmit leprosy by means of insects and the large number of arthropods harbouring acid fast bacteria which have been incriminated from time to time. Special reference is made to the Brazilian workers DE SOUZA ARAUJO DE OLIVEIRO CASTRO and MARIANO whose experiments especially that of the first named extensively reviewed in this Bulletin see especially 1945 v 42 1006-10. The present authors working in French Guiana examined 50 *Aedes aegypti* and 23 *Culex fatigans* captured in leprosy wards and found acid fast bacilli in 4 of the former and 8 of the latter they also cultivated acid fast bacilli on Lowenstein's medium from the crushed bodies of 4 *Triatoma rubrofasciata* which had fed on lepromatous lesions and 96 *C. fatigans* from leprosy wards the bacilli could not be sub-cultured. A culture of acid fast bacilli which could be maintained on ordinary media was however obtained from 9 inoculations of *Boophilus microplus* collected from cattle. This strain has been studied and compared with de Souza Araujo's strains which it resembles biochemically and in its failure to produce a tuberculin but from which it differs in some cultural characteristics. The author considers that the strains studied are related to the majority of the paratubercle bacilli isolated up to now which do not produce tuberculin (although CABASSO *Bulletin of Hygiene* 1942 v 17 660] demonstrated a tuberculin in an acid fast saprophyte isolated from a fly).

[It is noteworthy that MOISER [this *Bulletin*, 1946, v. 43, 454; *ibid.*, 1947, v. 44, 321], who found acid-fast bodies in 69 per cent. of cockroaches in a hospital and neighbouring kraals, and in the dried droppings of the insects, did not find them in the bodies of other insects, such as fleas, bugs or ticks. Moiser assumes that the acid-fast organisms found were "Hansen's bacillus"; but in a comment on the first abstract quoted above, it is stated, on the authority of Professor BUXTON, that cockroaches eat a great variety of types of food, and that many types of bacilli, including presumably acid-fast organisms, may well be expected to be found as normal inhabitants of these insects. See also MOISER, below.]

Short of transmission experiments—the difficulties of which are evident—the imposing amount of recorded work accumulating upon acid-fast bacilli in arthropods can hardly be expected to bear very fruitful results in its present form. If ever there was a need for a rigid fulfilment of Koch's postulates, this would appear to be one, but in the absence of suitable experimental animals, the difficulties remain.]

H. J. O'D. Burke-Gaffney.

MOISER, B. Transmission of Hansen's Disease (Leprosy). *Acta Med. Scandinavica*. 1946, v. 126, No 4/5, 347-50, 4 coloured figs. on 1 pl.

This is a further paper in support of the author's hypothesis that infection is transmitted by the bites of cockroaches. It commences with the following emphatic statements, which will be accepted by few experienced leprologists. The exact manner of transmission "is still quite unknown". [For several instances in which the patient developed the first signs of leprosy at the site of a wound made during operation on an infective patient, or by other direct inoculation of the infection, see *Leprosy* (ROGERS & MUIR) 3rd Ed., pp. 89-91.] "There is no proof whatever" that the disease is transmitted by infection or contagion. "Over 60 per cent. of my native patients had definitely never been in contact with the disease". [How did they know they had never approached an unrecognized case?] The author's long experience gives him "confidence in distinguishing *M. leprae* from other acid-fast bacilli, so that the bacilli found in the roaches in a Hansen Hospital can be positively claimed as *M. leprae*." It is on microscopical examination alone that he bases this conclusion. He goes on to repeat that roaches ingest the bacillus of Hansen in great numbers when fed on leprosy nodules and the organism can be found in their gut in large numbers up to the 19th day, and remain unchanged in the dried droppings of the roach for at any rate sixteen months. The most notable feature in roach-slides is the presence of groups of acid-fast oval bodies, which are illustrated by a coloured plate, together with a few free bacilli and an acid-fast mycelial branch. The only new point in this note is that Professor REENSTIERNA, of Sweden, at once recognized these oval bodies as greatly resembling the "maternal fungus", which he had discovered in 1912 in a culture from blood taken from a Swedish leper, and which, in 1939, he had detected in direct films of blood taken from the arm-vein of another Swedish leper (in which he also found Hansen's bacillus), and which he also found in leprosy nasal smears, etc. The author also repeats that he has reported similar bacilli in roaches caught in native huts, several miles from the leper hospital, in which no case of Hansen's disease has ever been known to occur. [The statement that Reenstierna discovered the "maternal fungus" in a culture from the blood of a leper seems to prove that it is very different from the true *lepra* bacillus, over seventy years' innumerable attempts to culture which have all proved negative. Confirmation or otherwise of Moiser's ingenious hypothesis will be awaited with interest.]

L. Rogers.

principle Improvement was noted in 25 per cent of the treated patients after six months in 50 per cent after one year in 75 per cent in two years and in almost 100 per cent in three years. Nodules shrink and become absorbed ulcerations heal including plantar ulcers regrowth of hair occurs oral and nasal lesions clear up leprosy laryngitis improves tracheotomies become unnecessary eye lesions may also improve and fever reactions cease to occur. Further the proportion of bacteriologically positive tests progressively declines and at the end of four years negative reports exceed 50 per cent this strongly indicates bacteriostatic effects. Histological studies indicate elimination of bacilli from the blood stream. Nineteen prominent reactions became negative for a year. Diasone administration but they have not been used as long as promin and are expensive. L. Roger.

FAGET G. H. & POGGE P. C. Treatment of Leprosy with Diasone. A Preliminary Report. *Leprosy Review* 1947 Jan. v. 18 No. 1 17-23

REENSTIERNA J. On the Specificity of an Anti-Leprosy Serum. Reprint from *Acta Dermatol. Venereol.* 1943 v. 24 311-16 in *Internat. J. Leprosy* Cleveland Ohio 1947 Jan-Mar. v. 15 No. 1 78-82 4 figs

The author has recorded numerous trials in leprosy of a serum he made by repeated injection of sheep with Kedrowski's acid fast bacillus cultivated from a leprosy case [see this *Bulletin* 1943 v. 40 152]. In this paper he records the results of electrophoretic analyses of his serum made for him at the University Institute of Physical Chemistry. Tracings are given of the results in both normal and anti-leprosy sera to show that only in the latter are rises of curves seen which represent increased amounts of α , β and γ globulins.

of antibodies and thus strengthens the author's opinion that the therapeutic results obtained with the anti-leprosy serum are partially due to a specific action. L. Rogers

DHARMENDRA & MAHERJI N. Prognostic Value of the Lepromin Test. *Leprosy in India* 1946 July. v. 18 No. 3 80-87 [11 refs.]

AUSTIN C. J. Control of Leprosy [Correspondence] *Brit. Med. J.* 1946 Apr. 12 506-7

In this letter Austin quotes the following statement in a leading article of the *British Medical Journal* of November 2nd 1946 p. 655. It soon became evident that compulsory isolation had become worse than useless. He goes on to defend the use of compulsory segregation in Fiji and quotes from an account of the work there [see this *Bulletin* 1945 v. 42 736] to show good results with 25 per cent of admissions discharged as arrested. He states that in dealing with the disease in 40 scattered islands the voluntary system would not enable the earlier cases to be found and treated. He therefore protests against the assumption that because a policy has been found to be possible or inadvisable in certain areas it is thereby necessarily to be condemned everywhere.

In a short letter in the *British Medical Journal* of April 26th 1946 Rogers mentions that the leading article in question dealt mainly with his paper

Helminthiasis.

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the same journal of June 1st, 1946, p. 825. He recalls that what he has condemned "as worse than useless" is the indiscriminate compulsory isolation of all types of leprosy, including a large proportion of uninfected neural cases, with consequent hiding of most patients until their disease has become too advanced to be amenable to treatment and they have infected members of their households—a plan now nearly universally modified. He quotes from a memorandum of 1925 his view that: "No hard-and-fast rules can be laid down to cover every area," and he agrees that Fiji, with only 2,775 cases in 1936 [see *Leprosy*, 3rd Edit., p. 14] is a very exceptional case where good work is being done. [A table of estimated leprosy cases in the British Empire shows that out of a total of 1,733,482 no less than 1,722,900 (over 99 per cent.) are in Asia and Africa, where no one would now suggest the possibility or advisability of attempting the old wholesale segregation plan. See *Leprosy*, 3rd Edit., p. 48.] L. Rogers.

HELMINTHIASIS.

MAY, Ella L. Parasktologic Study of 400 Soldiers interned by the Japanese. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 129-30.

The 400 American soldiers referred to in this paper had been interned in the Philippines and in Japan for more than 3 years.

Laboratory examination of 1,692 stool specimens, mostly by zinc sulphate floatation, revealed the presence of parasites in 86 per cent., 76 per cent. of the men showed parasites usually regarded as pathogenic.

Trichuris was found in 40 per cent., hookworms and *Ascaris* in 35 per cent. each, *Entamoeba histolytica* in 11 per cent.; *Endolimax nana* in 15 per cent. Other parasites were in small numbers. It is noted that ova of *Trichostrongylus* were found in five patients, and its resemblance to that of hookworm and *Heterodera radiculicola* is stressed. It is also noted that in over 60 per cent. of cases, two species of worms were present and in 1 per cent. four species were found.

H. J. O'D. Burke-Gaffney.

OLIVER-GONZÁLEZ, J. Immunological Relationships among Polysaccharides from various Infectious Organisms. *J. Infect. Dis.* 1946, Nov.-Dec., v. 79, No. 3, 221-5.

OLIVER-GONZÁLEZ and TORREGROSA [this *Bulletin*, 1945, v. 42, 45] have shown that a polysaccharide obtained from *Ascaris suum*, *A. lumbricoides*, *Trichinella spiralis*, *Necator americanus*, *Schistosoma mansoni* and the larval form of *Taenia solium*, inhibited the α and β isoagglutinins present in human sera; and a polysaccharide substance which also inhibits the α isoagglutinins has been isolated from Type I pneumococci by WITEBSKY, METER and SOBOTKA (*J. Exper. Med.*, 1935, v. 61, 703) and from Type XIV pneumococci by BEESON and GOEBEL (*ibid.*, 1939, v. 70, 239). The paper here abstracted records further studies of the immunological relationships of these substances.

For the author's technique and the details of his experiments, the original paper must be consulted. He was able to isolate polysaccharide fractions from *Ascaris lumbricoides*, *Trichinella spiralis*, *Fasciola hepatica* and the spiny-headed worm of the pig, *Macracanthorhynchus hirudinaceus*. Polysaccharides derived from Pneumococci, Types I, III and XIV were supplied by Dr. W. F. Goebel.

The author found in precipitin tests a high degree of cross reactivity between the polysaccharides which indicated a close immunological relationship between

patient) were adequately made, they did not reveal any change which could be attributed to *S. japonicum* and the author thinks that, in relatively light infection, the mature worms do not usually inhabit veins so high as those of the stomach. He notes that others have shown that both *S. japonicum* and *mansoni* regularly inhabit the veins of the rectum. Charles Wilcocks

MASON, P. K. DANIELS W. B. PADDOCK F. K. & GORDON, H. H. Late Phase of Asiatic Schistosomiasis. *Arch Intern Med* 1946, Dec., vol. 66, 662-78 [Refs in footnotes]

This study is based on the observation of 300 American soldiers admitted to Harmon General Hospital approximately six months after the onset of acute symptoms of schistosomiasis.

From the case histories and the patients' reports, an analysis of the early symptoms was made.

(61), tenderness in the abdomen (61) and

(61), sweating (54), stiff neck and urticaria (27 per cent), rash and jaundice (10 per cent).

The stools were examined by direct smear in all cases and in some by concentration methods. During an initial admission period of two weeks, at least six stool specimens were examined. If these were all negative, six other specimens were examined after a period of four weeks' leave, and if these were all negative six more examinations were made after another period of three weeks' leave. In only 17 per cent of those eventually found positive were ova found at the first examination. In 13 per cent of cases no ova had been found by 10th examination, and in at least three cases more than 20 examinations were made before ova were found. After treatment of the infected patients, the same routine was followed: on an average 19 negative stools during a period of 3½ months were obtained in 47 of 57 patients discharged as cured. An attempt is being made to follow these patients for longer periods.

All the patients appeared to be in good physical condition when admitted; none was acutely ill, but 85 per cent had residual minor symptoms, e.g. abdominal discomfort (52 per cent), weakness (25 per cent), myalgia, headaches, nervousness and palpable liver (11 per cent). During the first two weeks ova were found in 30 per cent of patients with symptoms and in 38 per cent without symptoms.

During the acute phase (overseas) only 22 per cent of patients had total leucocyte counts below 10,000 per cmm and only 6 per cent an eosinophil percentage below 9. In contrast during the present study, 64 per cent had total counts below 10,000 per cmm and none above 20,000, and 50 per cent had eosinophile percentages below 9. The average eosinophile count of 14 patients was 14 per cent, of which one-fourth had 20 per cent or more. From 10 to six weeks after successful treatment the average of 45 patients was 6 per cent, with none more than 20 per cent, but after unsuccessful treatment, the average eosinophile count of 32 patients was 10 per cent, of which two patients had over 20 per cent. There was a tendency for a high eosinophile count to indicate the persistence of ova, but there were too many exceptions to make it a good diagnostic criterion.

Proctoscopic examinations of all 300 patients were made and in only three were definite lesions found.

Liver function tests were carried out on 250 cases. In only a few, about 5 per cent, were the tests positive whether ova were present or not. Two patients were accidentally killed; both had livers that were riddled with milium

abscesses and fibrotic nodules surrounding schistosome ova, although in one no ova had been found in the stools for 5 months and in the other the liver function tests were all normal.

Out of 481 patients considered to be suffering from schistosomiasis, eight showed neurological symptoms; three showed definite disseminated encephalomyelitis and three stupor. Six cases showed some cranial nerve involvement.

Treatment.—Of those patients who had had Fouadin prior to admission, 36 per cent. showed ova in their stools, whereas of those who had had potassium antimony tartrate, only 12 per cent. relapsed.

The routine treatments in the Harmon General Hospital were Fouadin 6.3 per cent., intramuscularly on alternate days, starting with 1.5 ml., 3.5 ml. and 5.0 ml. and continuing the last dose up to a total of 65 ml., (later a total of 105 ml. was given) for potassium antimony tartrate, 0.5 per cent. solution in isotonic saline intravenously on alternate days, commencing with 8 ml., 12 ml., 16 ml. and 24 ml. and continuing with 24 ml. up to 320 ml. (later a total of 416 ml. was given).

After the first course of Fouadin, there were 82 per cent. of failures (ova still present); and after the second course (of 65 ml.) there were still 69 per cent. failures. On the other hand, after the first course of potassium antimony tartrate (320 ml.) there were only 19 per cent. of failures.

No serious toxic symptoms were observed after either drug; but with potassium antimony tartrate, many showed mild symptoms, coughing, nausea, vomiting and joint and muscle pains. With Fouadin, only joint and muscle pains were observed. Electrocardiographic observations were made in 66 patients: the alterations were limited entirely to changes in the T-waves. Thirty-one per cent. of patients on potassium antimony tartrate showed iso-electric levels or sharply inverted T-waves. Of these, 90 per cent. were again normal after a 30-day interval.

The symptoms also tended to disappear with the disappearance of the ova. Ninety per cent. of patients were symptom-free at the end of a period of observation of approximately three months, compared with 15 per cent. prior to treatment.

The authors conclude that potassium antimony tartrate given intravenously and slowly in 0.5 per cent. isotonic solution, in the doses indicated above, is the treatment of choice. They also stress the need for following these patients for longer periods.

L. E. Napier.

GALLIARD, H. & NGU, D. V. Particularités du cycle évolutif de *Diphyllbothrium mansoni* au Tonkin. [The Particular Nature of the Life-Cycle of *Diphyllbothrium mansoni* in Tonking.] *Ann. Parasit. Humaine et Comparée*. 1946, v. 21, Nos. 5/6, 246-53, 4 figs.

authors show that although the frog is the final transmitter of the infective plerocercoids to the canine definitive host, another essential intermediary is interpolated between *Cyclops* and the frog.

In the early part of the experimental cycle, 100 per cent. of *Cyclops* became infected with proceroids 17 to 20 days after exposure. *C. leuckarti* and another undetermined species were susceptible but the males only became infected. Attempts to infect frogs, *Rana tigrina*, with plerocercoids by feeding them with infected *Cyclops* failed completely, although this species of frog normally harbours large numbers of plerocercoids at certain times during the year. These data

from the inoculated area and a negligible number beyond 2 inches. In one of the present authors' experiments with stretched cotton blankets it was found that of 22 413 laterally migrating larvae 60.5 per cent had migrated more than 2 inches from the area in which the egg-containing faeces had been placed. 11 per cent more than 4 inches and some as far as 8 inches. In a second experiment in which 31 689 larvae were found beyond the inoculated area 27 per cent were beyond 2 inches, 4 per cent beyond 4 inches and 20 larvae (0.07 per cent) beyond 8 inches.

The epidemiological implications of this observation of fomite-borne ancylostomiasis were discussed. At the time of and shortly after the American re-occupation of Guam many young children and infants with severe even fatal ancylostomiasis were admitted to the Agaña hospital. Some of these belonged to age-groups usually free of ancylostomiasis and it is thought that these might have been infected from the dirty and damp bed-clothing to which they were exposed during the exceptional conditions that prevailed. It is also thought that reinfection from their own soiled clothing was not uncommon among the fighting personnel under combat or training conditions in a damp tropical climate.

The climatic conditions on Guam where these experiments were carried out are summarized as mean monthly minimum and maximum temperature—76° and 86°F, relative humidity at 6 a.m. 86 per cent and at 2 p.m. 73 per cent, rainfall 91 inches.

[It is not clear why the word fomite borne is used. The word is *fomes* plural *fomites* as indicated in a footnote. It should therefore be *fomes-borne* or since the plural is the more familiar word *fomites borne*.]

L. E. Napier

BARBER F. Surgical Aspects of Roundworm Disease. *Brit Med J* 1947
Jan 11 49-50

The author practising as a surgeon to the native population in Cyrenaica, repeatedly encountered roundworm infestation simulating surgical conditions. Three cases are quoted.

(i) A boy of 13 was brought to hospital with spastic abdominal pains and violent vomiting. He had restricted abdominal movements, tenderness and rigidity especially in the right iliac fossa. Appendicitis was diagnosed. At operation much turbid fluid was found but no pus. The appendix was free but had a pink tip. It was removed and found to contain a faecolith. A *presenting loop of ileum which was crammed with Ascaris lumbricoides* was opened and 91 worms were removed. He made an uninterrupted recovery and at a later date anthelmintic treatment produced a few more worms.

(ii) A girl of 5 was admitted with abdominal pains and retching and she had a temperature of 99.5°F and slight local abdominal signs. Intestines distended with worms could be felt through the abdominal wall. Santonin and castor oil were given and masses of ascarides were passed. All symptoms subsided.

(iii) A boy of 3 was admitted with abdominal pain and vomiting of two days duration and no motion for three days. The temperature was 101°F. The breathing was thoracic, the abdomen distended, tender and rigid and there was free fluid. At laparotomy the appendix was found normal but the abdomen contained bloodstained turbid fluid of slightly faeculent odour and a loop of intestine containing worms was thickened with inflammatory infiltration and was kinked. An opening was made and 30 worms removed. A drain was

inserted and the abdomen closed. The child improved at first but later deteriorated and died 12 days after operation, with numerous ascarides emerging from the nose and throat.

The author considers that, in a country where this infection is prevalent, ascaris infestation should always be kept in mind; operation will often be avoided. If operation is performed, as complete removal of worms as possible is indicated since anthelmintics are contra-indicated for two weeks after incision of the gut.

L. E. Napier.

GALLIARD, H. & NGU, D. V. Technique de numération des microfilaires du sang en goutte épaisse. [Technique of Counting Microfilariae in a Thick Blood Film.] *Ann Parasit Humaine et Comparée*. 1946, v. 21, Nos. 5/6, 234-6, 2 figs.

A method based on calculating the approximate thickness of the film from the number of leucocytes present

SHARMA, G. K. & HUSSAIN, A. A Note on Guinea-Worm Infection in Dogs. *Indian J. Vet. Sci. & Animal Husbandry*. 1946, Mar., v. 16, Pt. 1, 31-2.

This paper records the finding of three adult *Dracunculus medinensis* in different sites in the legs of a bull-terrier in Lahore. Other cases in the literature are also quoted. Smears from the residual ulcers and from the ruptured uterus of one of the adult parasites showed larvae of the worm. A second case was observed later in an Alsatian, which harboured *D. medinensis* in an eruption on the brisket.

The first case is illustrated by a photograph, which shows the adult *Dracunculus* clearly emerging from the right metatarsus.

[The possibility of infected dogs being a source of pollution of drinking water should be kept in mind.]

H. J. O'D. Burke-Gaffney.

STOLL, N. R., CHENOWETH, B. M., Jr., & PECK, J. L., Jr. Low Incidence of *Enterobius vermicularis* in Natives of Guam, M.I. *Puerto Rico J. Pub. Health & Trop. Med.* 1947, Mar., v. 22, No. 3, 235-43. [Refs. in footnotes.] [Spanish version 244-53.]

"An exceptionally low incidence for *Enterobius vermicularis* (one per cent.) was found among native Guamanians examined by scotch tape. Necropsies failed to reveal pinworms. Earlier records point to a low incidence of pinworms for at least several decades. This record indicates that conditions on Guam, in which there occurs widespread intestinal parasitism, do not favor the life history of this parasite.

"Of subsidiary interest is the absence of evidence of tapeworm infections in natives of Guam. In the case of *Hymenolepis nana*, this suggests that unfavorable conditions for its transmission are related to conditions unfavorable for *Enterobius*."

GÉRARD, R. Petite épidémie de trichinose en Algérie. [A Small Outbreak of Trichinosis in Algeria.] *Rev. Méd. Nav. (Métropole et Outre-Mer)*. 1946, v. 1, No. 4, 353-62, 1 chart.

DEFICIENCY DISEASES

HARE K. P. Kwashiorkor (Malignant Malnutrition) arising in Assam. *J Trop Med & Hyg* 1947 Apr 1 50 No 4 63-8 [15 refs.]

The chequered history and nomenclature of the malignant malnutrition syndrome now generally associated with kwashiorkor are indications of its complex nature and aetiology. The author briefly reviews the distribution of the condition commonly described in East and West Africa and in South America.

(*ibid.* Bulletin 1934 1 31-34 and the adoption of the name malignant malnutrition by TROWELL and MUWAZI *ibid.* 1946 1 43-363). The author wisely defines his terms of reference by adopting as criteria of diagnosis certain essential features set out by Trowell and Muwazi and also in an important study by HUGHES *ibid.* 766.

These features are sufficiently important to merit quoting in full. They are the following —

Diagnostic features —

- (1) Failure of growth or gross loss of body weight
- (2) Oedema.
- (3) Crazy pavement dermatosis
- (4) Diarrhoea and frequently steatorrhoea.
- (5) Angular stomatitis
- (6) Deficiency bowel pattern on radiographs
- (7) Fatty degeneration of the liver
- (8) High mortality often with sudden and unexpected death.

Secondary features —

- (1) Anaemia of varying type

The author states that while Trowell and Muwazi believe the disease to be

believes that the diet of labourers in his district in north-east Assam is probably almost identical with that described in Mitra's survey in the author's districts: milk and its products are not consumed and meat, fish and eggs are taken only sparingly by a few people. The regular diet consists largely of rice, dal (lentils), leafy and non-leafy vegetables, molasses, mustard oil, spices and salt. Fermented rice beer is taken copiously at the week-end and in some cases a small allowance of fish and meat is consumed.

The common local deficiency diseases are microcytic, macrocytic and mixed anaemias, nutritional oedema, various manifestations of vitamin A deficiency and nutritional diarrhoea (commonly curable by nicotinic acid).

Among 20,000 people the author in nine years has not seen more than half a dozen cases of true beriberi and only one or two of scurvy or pellagra. Rickets is scarcely seen; the burning feet syndrome is very rare and nutritional ataxic paraplegia was only encountered twice. Only one case of ariboflavinosis

of local origin was seen, despite a careful watch kept since 1942. No scrotal dermatitis was seen.

The author suggests that the rarity of the signs of ariboflavinosis in his part of Assam may explain why kwashiorkor has not yet been observed: yet, on the other hand, it has not been reported from South India either, where

... tails of the comparative
... patients were females,
... and the fourth being about
... ptoms and oedema, one
for general debility, and one for night-blindness and corneal ulceration. All of them died within 2 to 7 weeks of admission, death in two cases being unexpected and fairly sudden.

Investigation was not complete, through lack of some facilities, particularly autopsies: but the author produces much evidence to claim that most of the diagnostic criteria of kwashiorkor were fulfilled. All the patients showed loss of weight, oedema, crazy-pavement dermatosis and diarrhoea: two had angular stomatitis, and a third showed some evidence of riboflavin deficiency; the mortality was high, and the characteristic rather sudden form of death described by Hughes was noted.

The author doubts whether riboflavin deficiency plays a prominent part in the syndrome: he inclines more to the view of Williams and of Trowell and Muwazi that a complex deficiency is present, or that a conditioned toxæmia operates, having either a dietetic or an infective origin: such a toxæmia would be aggravated by an associated vitamin deficiency and hypoproteinaemia.

[This is a useful contribution to the study of a syndrome which, so long as its exact aetiology remains undetermined, will involve the careful examination and sifting of obscure or complicated cases of dietary deficiency.]

H. J. O'D. Burke-Gaffney.

McFADZEAN, A. J. S. Dermatitis as a Monosymptomatic Manifestation of Nicotinic Acid Deficiency. *Glasgow Med. J.* 1947, Apr., v. 28, No. 4, 103-15, 1 fig. [27 refs.]

The majority of writers on nicotinic acid deficiency have recorded the appearance of general and oral manifestations before the appearance of skin lesions. Major McFadzean describes 62 cases in which characteristic pellagrous dermatitis was the only symptom or sign.

The dermatitis was readily preventable or curable by adequate dosage of nicotinic acid and could be reproduced experimentally by exposure to sunlight or ultra-violet radiation. In one case, typical oral lesions were produced by deliberate irritation of mouth and tongue.

The patients, Europeans in the Middle East, had for many months eaten

... the site of the first clinically detectable lesion may be determined by local irritation. The statement that "in the absence of this [local irritation] no lesion developed" is not easy to accept as it stands: there can be little doubt that many biochemical lesions are present before the appearance of symptoms or clinical signs.]

Dean A. Smith.

HANDLER, P. Metabolic Complexities of Pellagra. *J. Lab. & Clin. Med.* 1947, Apr., v. 32, No. 4, 428-36. [60 refs.]

SPRUE

JONES E WARDEN H F & DUBBY W J Evidence for the Activity of a Second Member of the Vitamin M Group (Fermentation Factor) in Sprue A Case Report. *J Lab & Clin Med* 1947 Apr v 32 No 4 387-91 1 fig [10 refs]

A patient with sprue was treated intramuscularly twice daily with 5 mg of fermentation factor (pteroyldisglutaminic acid). A total quantity of 83 mg was given over a period of 10 days. A marked improvement in the blood picture was observed. The authors suggest that the vitamin M group in man and of the correctness of the hypothesis that the experimental analogue of sprue is vitamin M deficiency in the monkey.

DAVIDSON L S P GIRDWOOD R H & INNES Elizabeth M Folic Acid in the Treatment of the Sprue Syndrome *Lancet* 1947 Apr 19 511-15

The present report is primarily concerned with the haematological changes in 10 cases of the sprue syndrome after treatment with synthetic folic acid. A short account of the effects of treatment on the clinical features and the absorption of fat is also appended. Of the cases included four were classified as examples of tropical sprue, three as idiopathic steatorrhoea and three as coeliac disease.

The data set forth in two tables indicate that folic acid is a reliable therapeutic agent for the alleviation of certain clinical features of the sprue syndrome in adults. With the exception of one case which was reserved for special haematological studies, all showed excellent clinical response. Diarrhoea was

acid treatment. In all the test showed a failure of fat-absorption as compared with controls. Only in one did treatment improve fat-absorption as assessed by this test and there appeared to be no correlation between improvement or the reverse in fat balance tests and improvement or otherwise in the clinical or haematological results of treatment.

There now appears to be sufficient evidence to indicate that with a severe anaemia (erythrocyte count below 2 000 000 per cmm) in adults the blood picture is macrocytic and the bone marrow megaloblastic and this appears to be true also in some patients with coeliac disease.

During the past year the authors have investigated 33 adults with the sprue syndrome. The anaemia was usually moderate (mean red-cell count about 4 000 000 per cmm). The blood picture was macrocytic, the colour index and mean corpuscular volume high and the bone marrow was normoblastic. The degree of macrocytosis in the sprue syndrome when the red-cell count is 4 000 000 to 5 000 000 is striking and differs from the picture in pernicious anaemia in patients who have received adequate liver therapy. The authors have found that the anaemia of the sprue syndrome is particularly resistant to all forms of treatment. The hope that folic acid would provide an answer

in liver this was suggested in one case which responded favourably after 14 days treatment with protocolised liver (Hepamino).

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These results are in striking contrast to those of SPIES *et al.* [this *Bulletin*, 1946, v. 43, 769] and of GARCIA LOPEZ [*ibid.*, 1947, v. 44, 456] in tropical sprue in Cuba. These workers laid down the definite criterion that only those patients should be selected in whom the marrow was megaloblastic; but in only one of the present series was this fulfilled and in that one the most satisfactory response was obtained.

Tentatively, the authors put forward the hypothesis that in idiopathic steatorrhoea and coeliac disease in Britain the steatorrhoea is not primarily due to dietary deficiency or infection, but results from a constitutional abnormality of the bowel. This belief is strengthened by the familial history of steatorrhoea in some patients. To account for the fact that the syndrome may display itself in infancy or in adult life, they stipulate that there are modifying genes and special environmental factors which determine the ultimate onset.

There are reasons for believing that folic acid will give dramatic results in the treatment of megaloblastic anaemia of the sprue syndrome, but there is little evidence that it will of itself restore the red cells qualitatively and quantitatively to complete normality.

P. Manson-Bahr.

DAVIDSON, L. S. P. & GIRDWOOD, R. H. Folic Acid as a Therapeutic Agent. *Brit. Med. J.* 1947, May 3, 587-91, 1 graph. [16 refs.]

BRITISH MED. J. 1947, May 3, 604-5. Folic Acid. [14 refs.]

It has been demonstrated in animals that a deficiency of folic acid, however induced, results in a profound depressing effect on the production of red cells, leucocytes and platelets. The present paper records the results of the treatment of 48 patients suffering from a variety of disorders of the blood and alimentary tract.

Sixteen cases of pernicious anaemia treated with folic acid given in various amounts and by different routes are recorded. Effective haemopoietic response

necessitating blood transfusion, but a subsequent response was obtained with 5 mgm. intravenously. Large single doses, 200 mgm. folic acid intramuscularly and 400 mgm. orally, to two patients produced no side effects and resulted in excellent haematological responses which lasted 14 days. Large single doses are wasteful, however, since more satisfactory results are obtained with the same quantity given in daily doses of 5-10 mgm.

Folic acid did not produce reactions in four patients who were sensitive to parenteral liver therapy.

In one case, severe agranulocytosis developed during treatment with folic acid. The febrile reaction responded to penicillin therapy and the leucocytes started to rise after 150 mgm. pyridoxine daily by mouth, but three days afterwards multiple peripheral neuritis ensued—eventually the patient recovered.

No successful results were obtained in three cases of subacute combined degeneration of the cord. In five cases of refractory megaloblastic anaemia which had resisted large doses of anahaemin the responses were considered satisfactory. In one, a woman of 70, whose blood findings were typical of pernicious anaemia, the bone marrow was changed to the normoblastic state.

In aplastic anaemia, leucopenia and thrombocytopenia no therapeutic benefit occurred, either in those cases whose causation could not be determined or those arising secondary to some recognizable cause.

[August 1947]

The effects on the sprue syndrome are similar to those already published [see this Bulletin 1947 v. 44 342 and above].
In 5 cases of ulcerative colitis folic acid in doses of 60 mgm daily for 6-11 days produced no significant results.

These observations reinforce those of other workers—namely that a haematological response to folic acid will be obtained only in megaloblastic forms of anaemia.

When leucopenia and thrombocytopenia are part of a nutritional syndrome resulting from a deficiency of folic acid an increase of leucocytes and thrombocytes will result from folic acid treatment but when anaemia is of the normoblastic type and when leucopenia and thrombocytopenia result from other than specific nutritional deficiency folic acid is ineffective.

There appears to be little doubt that free folic acid (pteroyl-glutamic acid) is the factor essential for the continuation of normoblastic blood formation and a deficiency causes a reversion in pernicious anaemia to the megaloblastic state. When free folic acid is given in pernicious anaemia a transformation of the megaloblastic bone marrow occurs together with a marked increase of free folic acid in the urine but with conjugated folic acid (pteroyl heptaglutamic acid) as contained in yeast no such transformation takes place. But when purified liver extract is given parenterally in pernicious anaemia the classical haemopoietic response occurs together with a marked excretion of free folic acid. Hence it is assumed that purified liver extracts contain a factor which enables the conversion of conjugated folic acid to free folic acid.

This liberating factor which is the product derived from the interaction of Castle's intrinsic and extrinsic factors in the liver. It is present in that of normal persons but absent in patients with pernicious anaemia. This liberating factor is referred to as L.F. The cause of pernicious anaemia lies in the inability of the body to convert conjugated folic acid to the free form through lack of L.F.

Folic acid is a vitamin of the B₉ complex and may be expected to conform to the general principles governing vitamin therapy which are—

- (1) A beneficial result will occur only if the body is deficient in the vitamin
- (2) When a person has a sufficiency of a vitamin the giving of excessive amounts is valueless and wasteful
- (3) In a vitamin deficiency disease replacement therapy produces a therapeutic result rapidly

It is believed that the daily requirement of folic acid lies between 0.5 and 1 mgm.

There is evidence for the belief that for the treatment of any megaloblastic anaemia quantities of folic acid in excess of 10 mgm. daily are unnecessary and wasteful and if haematological and clinical improvement does not occur within two weeks it can be assumed that the disorder is not due to deficiency of folic acid and that continued administration is contraindicated. P. Manson-Bahr.

MORRISON R. J. G. & JOHNSTON C. R. St. Treatment of Tropical Sprue with Folic Acid. *Lancet* 1947 May 10 636-7

Four cases of tropical sprue treated with synthetic folic acid are described. The first two previously untreated showed a dramatic response. In one the blood count was not satisfactory in spite of the physical improvement. Free acid had returned to the gastric juice. In the second case the patient had gained over 13 lb. at the end of the first week and on the 37th day of treatment the haemoglobin was 9.5 per cent. and the red cells 4,200,000. The dose of folic acid was then reduced from 20 mgm.

to 10 mgm. daily and on the sixtieth day to 5 mgm. A fractional test-meal after treatment still showed achlorhydria.

The response of the last two was unsatisfactory. Both had received other treatment for some time. One was a longstanding case. The blood picture did not improve, though the fat-content of the faeces dropped from 27 to 12 per cent. The other, in a nursing sister, was of recent onset. Even on 100 mgm. of folic acid daily, no reticulocyte peak occurred, and no change either in haemoglobin or total red-cell count.

P. Manson-Bahr.

HAEMATOLOGY.

PROC. ROY. SOC. MED. 1946, Sept., v. 39, No. 11, 755-62 (Sect. Exper. Med. & Therap. 29-36), 7 figs., [22 refs.] Discussion on the Life and Death of the Red Blood Corpuscle [CALLENDER, Sheila T., LOUTIT, J. F.; JOPE, E. M.].

Sheila T. Callender, by bleeding and transfusion of healthy male volunteers, found that the average life of transfused red cells was about 60 days and that their rate of destruction was 0.83 per cent. of the initial amount per day, which, since transfused cells are of all ages, gives a value of 120 days for the normal life of a red cell. Experiments in women presented a slightly different problem. At each menstrual period, a fraction of the cells transfused is lost and the graph of survival of transfused cells, instead of being practically linear as in men, should show periodic steps. The menstrual loss is, however, insufficient to give a definite step, but it produces a curvature in the graph. From the difference in the graphs for males and females, the calculated menstrual loss appears about 300 to 400 cc. per period. This seems large, but the method of calculation is relatively inaccurate. Further studies are necessary, however, as there may be an additional destructive factor, possibly one related to ovarian secretion.

J. F. Loutit observed that normal cells transfused into patients with hypochromic anaemia had only a slightly diminished life of about 100 days and that the survival of normal cells transfused into patients with treated Addisonian anaemia was also not grossly abnormal. On the other hand, cells from untreated cases of pernicious anaemia transfused into convalescent subjects with mild hypochromic anaemia were rapidly destroyed. If the same destruction occurs in the persons from whom the blood was drawn, then undue haemolysis does occur in pernicious anaemia and no other explanation is needed for the haemosiderosis and the hyperbilirubinaemia. The life of cells transfused into patients with acquired acholuric jaundice was in all cases grossly diminished, and splenectomy did not greatly alter the mean length of survival. The survival of cells from cases of acquired acholuric jaundice transfused into normal persons was substantially normal. This suggested, therefore, that in acquired acholuric jaundice there is a circulating haemolysin, which destroys transfused red cells as well as the patient's own red cells. In congenital acholuric jaundice, there is an inborn defect of the red cells, shown in their diminished survival when they are transfused into a normal circulation, while normal cells transfused into patients suffering from congenital acholuric jaundice have a normal survival.

E. M. Jope stated that whereas methaemoglobin disappears rapidly from blood after the causative agent has been removed, sulphaemoglobin persists in circulating or in drawn blood for many weeks. It appears that the body has no means of removing sulphaemoglobin other than by destruction of the

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patients was preceded by reticulocytosis but there appeared to be little correlation between the degree of reticulocytosis and the rate of improvement. In most cases the improvement in volume which remained slightly increased even up to the end of treatment. In four patients who were given liver after folic acid the mean corpuscular volume resulted in a further improvement in the haemoglobin and red cell count and also in a lowering of the mean corpuscular volume. Folic acid given continuously in doses of 20-30 mgm a day for 30 days produced a greater improvement than when given interruptedly even in large doses of 100 mgm a day for the first week or two although the total amount during the month in the latter method was greater. The best response with folic acid occurred in cases where immature cells of the bone marrow and a better response was generally noted where the bone marrow showed a fair amount of normoblastic erythropoiesis than in cases where the reaction was predominantly megaloblastic. Patients with achlorhydria generally did not appear to respond as well as those secreting even only a small amount of acid. The improvement with folic acid did not appear to bear any relation to the previous dietetic habits of the patients provided they had adequate calories during treatment and it did not appear to be influenced by the protein intake provided this was not below the physiological minimum during treatment. Associated infections such as syphilis, amoebiasis, ankylostomiasis and ascariasis did not appreciably impede the rate of improvement. After treatment with folic acid most of the patients showed an increase in the white cell count but whether this was due to direct action of the drug on the leucopoietic tissue or due to increased vascularity of the marrow following the improvement in the anaemia was not determined.

F Murgatroyd

FROMMEYER W B Jr & SPIES T D Relative Clinical and Hematologic Effects of Concentrated Liver Extract, Synthetic Folic Acid and Synthetic 5-Methyl Uracil in the Treatment of Macrocytic Anemias in Relapse
J Med Sci 1947 Feb v 213 No 2 135-49 4 figs [15 refs] Amer

Comparative studies of macrocytic anaemias associated with pernicious anaemia, nutritional deficiency and tropical sprue treated with concentrated liver extract, folic acid and 5-methyl uracil showed that the reticulocyte peak was highest with the liver extract and lowest with the 5-methyl uracil. Differences in the rate of red cell increases were also evident. In one patient treated with liver extract there was an increase in the erythrocytes of 3.69 million per cmm of blood in approximately two months with synthetic folic acid the increase was 3.33 million while with synthetic 5-methyl uracil an increase of only 0.53 million occurred in 21 days and after two months the patient had already relapsed. In a second patient the reticulocyte response to folic acid was tremendous but the rate of red cell increase was definitely lower than it was following liver extract. Liver administered for 15 days produced an increase in red cells of 4.92 million while with folic acid the increase was only 2.35 million and a count of 4 million was never reached while with 5-methyl uracil the reticulocyte response and red cell increase were lower than with either of the other two substances. Similar responses were obtained in other patients.

With 5-methyl uracil there was also a definite delay in the onset of patients' subjective improvement which usually occurred some 3-5 days later than it did with either folic acid or liver extract. Glossitis was more consistently relieved by liver extract and by folic acid than by 5-methyl uracil in several patients treated with the last named substance the glossitis remained unchanged.

Symptoms referable to paraesthesiae were much more often relieved by concentrated liver extract than by folic acid.

The observations support the current idea that liver contains multiple anti-anaemic substances. There is not enough folic acid in concentrated liver extract to account for the activity of the latter and there is obviously not enough 5 methyl uracil. Methyl uracil may be converted into folic acid, possibly in the intestinal tract, and in this manner cause maturation of the red cells. It seems, however, that the active principle in liver extract is not folic acid but some other powerful substance. Although folic acid is inferior to liver extract it is of special value where there is sensitivity to liver. *F. Murgatroyd.*

VILTER, C. F., VILTER, R. W. & SPIES, T. D. The Treatment of Pernicious and Related Anemias with Synthetic Folic Acid. I. Observations on the Maintenance of a Normal Hematologic Status and on the Occurrence of Combined System Disease at the End of One Year. *J. Lab. & Clin. Med.* 1947, Mar., v. 32, No. 3, 262-73, 3 figs. [16 refs.]

Twenty-one patients with pernicious anaemia, treated with folic acid by mouth in doses of 10 to 15 mgm. daily, or 30 mgm. thrice weekly, suffered no apparent haematological relapse during the period of observation of over a year. Evidence was also obtained that a satisfactory haematological condition could be maintained similarly in patients with sprue or nutritional macrocytic anaemia. Three other patients with pernicious anaemia gave a similar haematological response but they required increased amounts of folic acid.

Four of the patients, however, with pernicious anaemia, after five months of folic acid therapy, developed numbness and tinglings in the hands and feet, unsteadiness of gait, and some stiffness in the limbs. Neurological signs appeared and progressed until there was clear evidence, including positive Rombergism and extensor plantar responses, of subacute combined disease. This condition failed to respond to large doses of folic acid, 50 to 500 mgm. by mouth daily for 10-14 days, but improved within ten days of giving refined liver extract intramuscularly. It is suggested, therefore, that there is an unknown factor in liver, other than folic acid, which is essential for maintaining the integrity of the nervous system in patients with pernicious anaemia, and that folic acid alone cannot be considered adequate treatment for pernicious anaemia.

F. Murgatroyd.

ROBERTSON, W. M. & FINDLAY, G. M. Sickle-Cell Anaemia in West Africa. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 435-46. [13 refs.]

Sicklaemia was found in 12.4 per cent. of African soldiers, and acute sickling crises occurred in about 0.6 per cent. of those with the sickling trait.

During the latent phases, patients have no symptoms excepting occasional joint pains. Crises, which often arise during the course of some serious infection or other disease, are manifested by pains in the joints, in the abdomen, especially over the spleen, and sometimes in the chest, presumably due to small thromboses and infarcts. The crises are characterized by a great reduction in the red cell

reticulocytosis,

Occasionally

lohin to reach

the renal threshold and for haemoglobinuria to result. Crises are common during pregnancy, and sometimes lead to foetal death; while in cases where the pregnancy goes to term the child appears to be more liable to sudden death within a few days of birth.

[August, 1947]

So protean are the symptoms of sickle-cell disease that tests for sickling should be made in all Africans showing anaemia or having any obscure disease. During a haemolytic crisis blood transfusions are of primary therapeutic importance. F Murgatroyd

TROPICAL ULCER.

DEWHOFF, E. & HOLODNY, V. H. Cutaneous Diphtheria and Tropical Ulcer. *Arch. Dermat. & Syph.* 1947 Mar. 55 No 3 360-68

The authors studied the bacteriological flora of tropical and other ulcers in 56 patients and examined the results of four distinct forms of treatment. The lesions were classified as tropical ulcer (19 patients), eczematoid dermatitis (15), atypical lichen planus (7), and other forms of dermatitis (15). Most of them were a month or more old and had had various forms of previous treatment.

Among the 56 patients 8 avirulent and 30 avirulent strains of *C. diphtheriae* were found. Organisms were also found in the faeces of one of the former patients and 14 of the latter. Diphtheroids were isolated in 13 cases. Among the 19 tropical ulcers virulent diphtheria bacilli were found in 3 and avirulent in 10. All patients having virulent diphtheria organisms in the skin lesions were Schick negative in those having avirulent or no diphtheria organisms. It is noteworthy that in 2 cases where only avirulent organisms were found a peripheral polyneuritis developed suggesting the previous presence of virulent organisms. Haemolytic staphylococci were isolated from almost every case in about 10 per cent, evidence of fusio-spirochaetosis nor signs of mycosis leishmaniasis inadequately treated syphilis or sickle cell anaemia.

The four plans of treatment were —
(1) Controls dressings of isotonic saline
(2) Identical with (1) except that the dressings were kept wet for two hours three times a day with sodium penicillin (250 units per cc) in isotonic saline
(3) Identical with (1) with the addition of intramuscular penicillin in doses of 20,000 units every 3 hours for 72 hours (total 480,000)
(4) Combined plans (2) and (3)

The results are shown in three tables in the text. It is evident on the criteria of disappearance of pathogenic flora and the healing of the ulcers that penicillin locally (plan 2) and penicillin locally and parenterally (plan 4) gave the highest percentage of successful results, namely 91 and 92 per cent respectively. Saline dressings alone and together with parenteral penicillin produced 30 and 56 per cent successes respectively.

With the most successful methods recorded above pathogenic organisms were eliminated in an average of 4 days and the bases of the ulcers showed healthy granulation in 3 to 4 days.

No significant scarring occurred where the ulcers were superimposed on a dermatitis but in tropical ulcers a thin atrophic scar remained none broke down under normal activity and there were no recurrences after 30 days.

Penicillin sensitivity took the following forms: exacerbation of pre-existing dermatitis following institution of parenteral penicillin (4 patients); generalized erythematous maculopapular rash (1); delayed reactions to

parenteral penicillin (3); urticaria (2); serum sickness-like syndrome (1). [This represents more than 25 per cent. sensitivity, a frequency which would detract from the value of the treatment: it is to be regretted that there is no record of patch tests, which would have indicated whether these results were in fact due to penicillin.] The authors are careful to point out that whilst local penicillin was evidently the treatment of choice, it cannot be expected by itself to produce satisfactory healing: it should be accompanied by rest in bed, regular cleansing, débridement, careful dressings and good nursing.

[Whilst the satisfactory results recorded in this interesting paper are beyond question, the title is somewhat misleading. In the text, the authors refer to "56 patients with tropical ulcers or ulcerated dermatitides": in a table, these are divided into four groups of lesions, not necessarily aetiologically related, and of which only one-third are described as "tropical ulcer".

The aetiology and clinical conceptions of "tropical ulcer" are subject to so much uncertainty that it is essential, in dealing with this condition, to begin by defining it; and then to describe the lesions encountered in terms of that definition. No such definition or descriptions are given in the paper: in their absence, in the failure to find fusospirochaetal organisms, and in the prevalence of *C. diphtheriae*, it is difficult to ascertain on what grounds a diagnosis of "tropical ulcer" has been made: indeed, the information provided suggests that the lesion so described may well be a veldt sore, a condition usually accepted as a separate entity and references in the text to other work serve to strengthen this belief.

Unanimity on what constitutes "tropical ulcer" is desirable, if such strikingly successful claims are to be established in respect of a condition hitherto so refractory to specific treatment.] *H. J. O'D. Burke-Gaffney.*

MISCELLANEOUS DISEASES.

KERSHAW, G. R. Acute Non-Specific Diarrhoea and Dysentery. Local Chilling of the Abdomen as a Causative Factor. *Brit. Med. J.* 1947, May 24, 717-19. [17 refs.]

Acute enteritis of unknown origin is common in Europeans on visiting or living in hot climates. It is important on account of its power of causing temporary prostration.

It is well known that chilling of the abdomen by rapid ingestion of cold fluid in large quantities when the body is heated induces diarrhoea, and also that chilling of the abdominal wall does likewise. Other methods of inducing diarrhoea are taking of quantities of ice-cream, or sitting in a wet bathing costume whilst sun-bathing.

Observations made on H.M. ships during the recent war provide further testimony that this form of diarrhoea was extremely prevalent in the tropics. The patient would be awakened shortly after midnight with generalized abdominal colic and an urgent call to defaecate; vomiting was rare and tenesmus absent. In severe cases, colic persisted until mucus was passed; sometimes the stools were blood-stained. Recovery was spontaneous and complete.

For this incidence, the plenum system of ventilation was held responsible; ratings who slept in hammocks suffered more frequently, earlier, and more severely than those who slept in camp beds. The effects of the author's investigations carry conviction that chilling of the abdominal wall is a common cause of non-specific enteritis afloat and ashore in all climates, but particularly

especially in spring and autumn, in windy or humid weather

The plenum system as arranged in living spaces for daytime usage is unsuitable for the ventilation of sleeping accommodation where hammocks or tier bunks are employed. By night a cholera belt or a blanket folded across the abdomen should be worn.

P. Manson-Bahr.

JETTMAR, H. M. *Personliche Erfahrungen ueber einige Seuchen Chinas* [Personal Experiences of some Epidemics in China.] *Wien klin Woch* 1947, Jan 24 & Feb 7 v 59 Nos 3 & 5, 33-6, 65-7, 1 map [Numerous refs]

The author has selected for description human plague, typhus, leprosy, amoebic dysentery and cholera and adds some remarks on relapsing fever, malaria and goitre. He intentionally omits smallpox, cerebrospinal fever, bacillary dysentery and the helminthiases.

extending southward to
Kwangtung and Yunnan
are bubonic, but
marmot, tarabig.
for the dwellings in the Fukien province are of stone in the south, of wood in the north, and the dirt and rubbish within and without them afford good ha-

of

aying down almost completely in the warmer months. Sera of patients in Kweichow agglutinate *Proteus OXI9* in high dilution, to 1:10,000, the *OXA* strain in low dilution, 1:80, occasionally 1:160. Kweiyang, the chief town of "the most rat infested town in of 349) caught. Of 908 fleas tophyllini, 24 were *Leptopsylla*

musculi and 108 were *Xenopsylla cheopis*

Leprosy is widespread. The author has little new to say of this; he suggests that small injuries from the wearing of rough straw sandals may be the sites of entry of infective material from the roads. He finds a formal gel reaction, 0.5 cc concentrated formalin to 2.0 cc serum, a useful diagnostic aid. The gel differs from that of kala-azar patients in remaining clear, but the test is of subsidiary value only since he finds it positive also "occasionally in chronic malaria patients and sometimes (manchmal) in other diseases."

Of the other diseases mentioned in this article the author gives quite good accounts, but has nothing fresh to offer. The southern provinces from Hunan to the coast may be said to be the home of cholera and "Shanghai is a cholera-endemic town." The infection is largely water-borne, because the water used for drinking, washing and cooking comes from streams polluted by dejecta; vegetables and garden produce fertilized by human excreta are another source of infection. Amoebic dysentery outbreaks are ascribed to latrine flies, especially

Chrysomya megacephala. The same insect is held responsible for the summer diarrhoea of infants and for some of the cholera.

The author refers to the malaria outbreak in Nanking in the summer of 1930 and that in south-west Kweichow in 1940, probably carried by *A. minimus* and *A. hyrcanus*, and the latter was the vector in the Szechuan outbreaks of 1939 and 1941, associated with the drying of the rice-fields.

Lastly, *goitre*. The author found foci of this disease in Lupinshan hills, in Yunan, west of Kunming, in south-west Kweichow and in Tulinshan. The people themselves ascribe the disease to the drinking water which has a low iodine content.
H. Harold Scott.

TRAQUAIR, R. N. *Pyomyositis*. *J. Trop. Med. & Hyg.* 1947, May, v. 50, No. 5, 81-9, 3 figs. [37 refs.]

This condition is characterized by suppuration in the skeletal muscles, and the paper under review is based on observations on a series of 31 cases occurring in young adult males in the West African Army (*i.e.* a selected population) and treated in the Gold Coast. Although the disease has been described in Japan and Europe it is most commonly met with in the tropics. No age or sex is immune but it has been most frequently described in young adult males.

The author divides the lesions into three types:—

- (i) Non-suppurative lesions only [can these strictly be called pyomyositis?].
- (ii) Suppurative lesions without recurrence.
- (iii) Recurrent and repeated abscess formation, in some cases complicated by severe pyaemia with suppurative myositis.

Type (ii) was the commonest in this series (16 out of 31 cases).

A description is given of selected cases. One developed a purulent pericarditis 26 days after detection of an abscess in the left deltoid and after treatment with 48 gms. of sulphathiazole. 300 ml of pus were aspirated from the pericardium, *Staph. pyogenes*, coagulase positive and penicillin sensitive was found on bacteriological examination; this patient was successfully treated with 1,100,000 units of penicillin given intramuscularly over a period of 11 days.

Cultures were made from the pus of 19 of the 27 suppurative cases; *Staph. pyogenes*, coagulase positive, was obtained in 18—the remaining specimen was sterile.

Biopsies from three non-suppurative cases were all sterile. Blood cultures were made in 11 cases and the staphylococcus obtained in 3.

Two types of case present difficulty in diagnosis: (i) those without local signs at onset—these may simulate any acute febrile disease. Discovery of leucocytosis is a help; (ii) mild cases with insidious onset and a lesion in the shoulder or pelvic girdle, when it may be very difficult at first to find any physical signs. Systematic examination of joint movements is of value, as the affected muscle is very sensitive and resistant to stretching. Cases with localization in the ilio-psoas muscle may simulate some intra-abdominal disease, especially appendicitis in the case of a right-sided involvement.

Although a bacteraemia is essential for development of a pyomyositis it is considered that some other factor is concerned—probably a vitamin deficiency, especially subclinical scurvy [the reviewer's experience in East Africa tends to confirm this]. Trauma may be an added factor, and also possibly filariasis from death of the adult worm in the muscle.

Treatment is fully described. The outlook has been greatly altered by the introduction of sulphathiazole and even more especially by penicillin, the latter obviously being the drug of choice. A single well-localized abscess may be opened without delay, but as a rule surgical treatment was not carried out until the infection was controlled by drug treatment.

Sulphathiazole was given by mouth commencing with an initial dose of 3 gm followed by 2 gm every 4 hours until the infection appeared to be under control. This drug should not be continued for more than seven days without a break—it may be resumed after a few days' interval. Leucocyte counts and daily examination of the urine were necessary. The largest dose of sulphathiazole in one course was 82 gm the largest amount given to any one patient was 103 gm plus 34 gm of sulphadiazine.

Operation. All the abscesses should be opened at one sitting, a small incision only being required. An extensive search should always be made for pus which may be difficult to find and if this is thin and only faintly turbid the wound may be sutured at once. Should thick pus be found a corrugated rubber drain is put in for a few days.

In three cases only was penicillin available. One patient received 1 250 000 units intramuscularly in 10 days, a second 1 100 000 units in 11 days, the third received only 300 000 in 3 days the drug being stopped as the organism was found to be insensitive.

[In one of these cases complicated by a purulent pericarditis the patient would almost certainly have died without penicillin.]
Compared with other series of cases reported there appears to have been a great reduction in the number remaining in hospital for over 4 weeks. There were no deaths although a mortality rate of close on 10 per cent is usually given. [It must be remembered however that this series was composed of healthy young male adults i.e. a picked population.]

C F Shelton

[An interesting paper especially on the clinical side.] J Trop Med & Hyg 1947 Apr

BURATTI R. T. Tropical Pyomyositis
50 No 4 71-5 (13 refs.)

A series of 50 cases treated in Nigeria are reviewed and compared with 50 controls examined in the hope of reaching some conclusion regarding aetiology. Detailed figures of sex or age incidence are not given.

The author considers that no single aetiological factor was established, although there was insufficient evidence from the controls to incriminate filariae, ancylostomiasis, avitaminosis or sickle-cell anaemia (17 patients show microfilariae in the blood as compared with 5 among the controls). A definite history of trauma was most commonly met with—11 cases out of 17. A definite association with general debility and a poor state of health. In only one case was septicaemia proved by blood culture [organism found not stated]. Pus was cultured in 40 of the cases and a *Staph aureus* grown in 24. *Staph albus* in 6 and 10 were sterile.

The author puts forward the following hypothesis:—(1) deep muscle abscesses in the tropics are caused primarily by a lowering of resistance of muscle tissue by one of several factors; this area becomes secondarily infected by pathogenic organisms already in the blood stream; the condition being especially frequent in those whose resistance has been lowered by chronic ill health. Septic lesions (especially of the feet) appear to be frequent foci of infection.

Diagnosis may be difficult as the abscess may be too deep for fluctuation to be detected and a dark skin tends to mask discoloration. Only one case in this series was complicated by a pyogenic arthritis.

Nineteen cases showed more than one abscess (34 abscesses were found in 19 patients). Some may resolve without operation.

Penicillin was not available for treatment and the author did not find the sulphonamides of much value. Once the presence of pus was obvious surgical treatment was found to bring immediate relief the strongest indications of

pus formation are extreme tenderness and a high temperature. A small incision only is needed, the abscess being drained thereafter. Convalescence is usually rapid, with no permanent disability.

[See also TRAQUAIR, above.]

C. F. Shelton.

VISWANATHAN, R. *Trop. Med. & Hyg. Med. Gaz.* 1947, Fe

An Indian soldier of 28, who had been suffering from breathlessness and asthmatic attacks for 6 months, was diagnosed as suffering from tropical eosinophilia: his total leucocyte count was 28,000 per cmm., with 44 per cent. eosinophiles. He received two injections of N.A.B. 0.3 gm. at a week's interval; twenty-four hours after the second one, he developed signs suggesting arsenical encephalopathy and he died 36 hours later; just before death, his leucocytes were reduced to 21,000 per cmm. and eosinophiles to 7 per cent.

At autopsy, punctate haemorrhages were seen in the brain and mesentery.

In the lungs, the principal feature was the presence of dark reddish brown areas, varying in size from "that of a split pea to that of a rupee": some resembled the early stage of infection. The bronchioles were very congested and contained blood-stained muco-purulent secretion.

Microscopically, the lungs showed several areas of interstitial fibroblastic proliferation, with alveoli containing macrophages and phagocytic monocytes. Most of these cells contained eosinophilic granules. Giant-cells, composed of fused mononuclear cells, were seen. The nuclei were centrally gathered in numbers of from 15 to 25. In some areas, a characteristic form of nodule was noted: this consisted of 4 or 5 giant cells, surrounded by a cluster of mononuclear cells, and quite unlike those seen in tuberculosis. The

round-cell preponderance in lung-smears, and a few eosinophiles were seen, in one guinea-pig which died after 7 days.

It is suggested that the haemorrhages in the brain and lungs were probably due to N.A.B. poisoning, but that the lesions in the lung suggested an infective process rather than an anaphylactic one: the only finding suggesting a virus origin was the perivascular monocyctic cuffing of the brain capillaries. The author asks whether "the virus of tropical eosinophilia activated by arsenic produced the cerebral lesion".

This report is put forward as a contribution to the pathology of tropical eosinophilia, death from which does not appear to have been reported before.

[Whilst the cause of death in this case appears to be complicated and uncertain, the peculiar histopathological changes described are of interest and may serve to throw new light on this condition: it would be difficult to formulate a hypothesis as to the aetiology on the evidence presented alone. The possibility of a viral aetiology is suggested by the evidence presented between the various operative factors. In any case, the use of the term "virus of tropical eosinophilia" is premature.]

H. J. O'D. Burke-Gaffney.

[August, 1947]

- GELBERG HANSEN G Erythema chronleum migrans Afzelli and Meningitis after a Tick Bite. *Acta Dermato-Venerologica* 1948, Mar. v. 25, No 5, 458-63.
- JACOBY H Cause, Symptoms and Treatment of Lathyrism. A Specific Nutritional Neuropathy. *Indian Med Gaz* 1947 Feb v. 82 No 2, 53-8 [20 refs.]
- LOWE C U & AUGUSTINE, D L Creeping Eruption in New England. A Report of Two Cases. *New England J of Med* 1947 May, 1, v. 236 No 18 658-61, 1 fig [16 refs.]

GENERAL ENTOMOLOGY

- PENN, G H The Larval Development and Ecology of *Aedes (Stegomyia) scutellaris* (Walker, 1859) in New Guinea. *J Parasitology* 1947, Feb v. 33, No 1, 43-50 7 figs on 1 pl [10 refs.]
- PARROT L & DURAND-DELACRE R Notes sur les phlébotomes LVI Phlébotomes de Beni Ounil-de-Figuig (Sahara oranais) (The Species of Phlebotomus in Beni Ounil-de-Figuig.) *Arch Inst Pasteur d Algérie* 1947, Mar v. 25 No 1, 77-88 5 figs [34 refs.]

- GILL, S Excessive Reactibility to Sandfly Bites. *Acta Med Orientalia* 1947, Mar. v. 6, No 3 104-5 2 figs

The effects on man of the toxic salivary secretion of the sandfly may be very severe, but previously susceptible persons may become desensitized or even immune after repeated exposure to bites.

The author records two cases to illustrate that (1) such immunity may be transitory and (2) it may be inherited.

The first case relates to a woman of 30 years who on her arrival in Haifa in 1939, suffered from excessive reactions to sandfly bites. She had an allergic history. After a few weeks she became immunized against sandfly "venom", but the reaction reappeared in severe form in 1944 five years later.

The second case relates to a 20-year-old woman who arrived in Haifa in 1938, in her third month of pregnancy. Early in the sandfly season she developed a giant bulbous dermatitis which lasted for some weeks. The following summer she reacted to sandfly bites with small papules only. her newly-born infant did not react at all until he was 4 years old when he developed a vesiculo-bulbous dermatitis after sandfly bites. Afterwards he developed immunity once more.

The author concludes that the child had inherited his mother's susceptibility to sandfly venom, together with antibodies against it but his immunity was only temporary and when it expired he reacted excessively and thereafter produced immunity for himself.

H J O D Burke-Gaffney

- HEATH, G B S & MITCHELL, J G Use of DDT against Sheep Ticks, *Ixodes ricinus* L. With a Statistical Note on Interpretation of Tick Counts by K L BLAXTER. Reprinted from *Vet J* 1946, v. 102, No 5 130-40, 2 pls
- The tick *Ixodes ricinus* is primarily of veterinary importance as the vector of the virus of louping ill and other animal diseases in Britain. *Ixodes* spp also carry the virus of the human disease Spring Encephalitis in Siberia.

Ticks are difficult to eradicate, and this paper to use DDT by incorporating it in a sheep dip in sheep. The results obtained were somewhat erratic, was good protection given to the sheep. This work indicates that, as has been found by other workers, DDT is a less efficient killer of arachnids than it is of insects. Further work may possibly ensure better effects against the ticks of veterinary importance. So far, results do not encourage the use of DDT against ticks of medical importance. K. Mellanby.

DELPHY, L. P. Révision, par des voies expérimentales, du genre *Hyalomma* C. L. Koch 1884 (*Acarina, Ixodoidea, Ixodidae*). Note préliminaire. [Experimental Study of the Genus *Hyalomma*: Preliminary Note.] *Ann. Parasit. Humaine et Comparée*. 1946, v. 21, Nos. 5/6, 267-93, 3 figs. [21 refs.]

DOUGLAS, J. R. The Internal Anatomy of *Dermacentor andersoni* Stiles. *Univ. California Publ. in Entom.* 1943, v. 7, No. 10, 207-72, 7 figs. & 19 pls. [49 refs.]

The tick *Dermacentor andersoni* has been shown to be the most important vector of Rocky Mountain spotted fever and also to be a carrier of tularaemia, various fevers, and tick paralysis. It may also carry other diseases.

This paper contains the first detailed account of the internal anatomy of the tick. The various systems are described, and many clear plates, diagrams and photo-micrographs are reproduced. This information is primarily of importance to research workers on the diseases mentioned above, but anyone concerned with tick-borne diseases and with the cycle of the causal organisms in the arthropod host will find this paper of importance. Kenneth Mellanby.

TARI, C. M. *On the Internal Anatomy of the Ticks of the Genus Hyalomma*. *Ann. Parasit. Humaine et Comparée*. 1946, v. 21, Nos. 5/6, 293-304, 10 figs. [21 refs.]

BORELL, A. E. & BRYANT, M. D. Mammals of the Big Bend Area of Texas. *Univ. California Publ. Zool.* 1942, v. 48, No. 1, 61 pp., 1 fig., & 5 pls. [32 refs.]

A list of mammals including a number of species of rats, which may prove of medical importance.

LABORATORY PROCEDURES.

VAGÓ, S. Méthode de coloration pour l'examen microscopique des spirochètes. [Staining of Spirochaetes for Microscopic Examination.] *Schweiz. med. Woch.* 1947, Apr. 26, v. 77, No. 17, 479-80.

The author refers to the difficulty in obtaining a simple and reliable staining method which will be suitable for all types of spirochaetes. He notes the multiplicity of methods, based on different chemical reactions, which are commonly used, citing no less than eleven well-known techniques. Different species of spirochaetes vary in their capacity to stain, and most techniques have a limited field of usefulness. Methods based on modifications of existing ones have not, on the whole, proved satisfactory, in the author's view.

He has therefore elaborated a new method, which is not based on any of the existing ones. The procedure is as follows:—

The specimen spread thinly on a slide is dried in air, without fixation. It is stained with a concentrated aqueous solution of mercurochrome washed in water stained with a concentrated aqueous solution of Pyocyanin [methyl violet] and again washed in water.

The preparation is then ready for examination. The spirochaetes stain blue black, the other microorganisms and elements are also stained as in all other methods for staining spirochaetes. [The colour taken by these elements is not clearly stated].

The author states that this method stains not only those species which are readily stained by previous methods but also certain pathogenic species which are notoriously difficult to stain. The microscopic picture is clear and the background clean. The spirochaetes stain intensely with sharply defined outlines. Practical advantages claimed are fixation and heating are unnecessary, time is shortened and the shape of the spirochaete preserved. Preparation of the stains is simple and no weighing is necessary. The solutions keep indefinitely. The time taken by the staining is required.

The author states that the various species of *Leptospira* usually difficult to stain are shown up clearly and deeply stained by this method. In fact contrary to usual experience they stain more clearly than *Trep pallidum*.

[A method claiming such a variety of advantages merits intensive study.]
H J O D Burke-Gaffney

CONEN H A A New Quick Method for Staining *Treponema pallidum* Acta Med Orientalia 1947 Mar 16 No 3 99-100

This author describes a method devised for reasons comparable to those given by VAGG [above]. The chemistry of the method is spread as thinly as possible on a slide and fixed at this technique is as follows —

Serum from the lesion is spread as thinly as possible on a slide and fixed at once by covering it with 36-40 per cent formalin solution and heating until evaporation is noted. The slide is then flushed with distilled water. For staining the following are added —

- 4 drops of a solution of equal parts of N/1 NaOH and N/10 NaOH
- 2 drops of 5 per cent $FeCl_3$ solution
- 4 drops of N/1 hydroxylamine hydrochloride
- 3 drops of 10 per cent solution of pyrogallol

The slide is heated until bubbles appear under gentle stirring. The slide is flushed with distilled water and a few drops of an ammoniacal solution of $AgNO_3$ in 0.5-5 per cent solution are added. Staining is complete after a few seconds when the slide is washed with distilled water and air-dried.

Trep pallidum appears reddish brown on a light background under artificial light.

The author compared material from 14 syphilitic patients by dark ground illumination by Fontana's method and his own Wassermann and Kahn tests were also done.

Positive results were obtained 6 times with Fontana 9 times with dark ground and 11 by the author's method. All the three negative specimens in the last named series were also negative by the other two methods.

The method takes no more than one minute and the solutions need not be freshly prepared.
H J O D Burke-Gaffney

KYKER, G. C. & McEWEN, Mildred M. Rapid Continuous Extraction and Determination of Quinine. *J. Lab. & Clin. Med.* 1947, Feb., v. 32, No. 2, 196-205, 1 fig. [19 refs.]

The authors describe and illustrate a simple apparatus for the continuous extraction of quinine from biologic fluid or tissue by continuous extraction of a digested sample with chloroform. Specially designed apparatus which is simple in construction is described in various dimensions. The extractor represents an interchangeable adaptation of one proposed previously, so that the complete unit permits extraction with solvents of either greater or lesser density than water. The procedure enables the versatile selection of two or more established methods of analysis for simultaneous application to individual samples and stresses the value of this practice in metabolic studies since no specific method is available for quinine. The procedure has proved efficient and convenient during extensive use in animal work.

J. D. Fullon.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

QUEENSLAND INSTITUTE OF MEDICAL RESEARCH. Brisbane. First Annual Report Year ended 30th June, 1946. [DERRICK, E. H., Acting Deputy Director]. 7 pp.

This new Institute was established in 1946 as a result of proposals originating in 1944; it is controlled by a Council under the chairmanship of the Director-General of Health and Medical Services, Sir Raphael CILENTO. The functions of the Institute are to conduct research into any branch of medical science, but there is an emphasis on Queensland fevers, lead poisoning, virus diseases, industrial diseases, nutritional and social conditions, climatic conditions and tropi

It is a building used by the Army, but it will be used in association with the Pathological Department. In the present report the acting Deputy Director, Dr. E. H. Derrick, shows that there has, as yet, been little opportunity for scientific work. There is no doubt, however, that an Institute founded under such auspices, and maintained, as this will be, by the Government of Australia, will be a centre at which research work of the usual high Australian standard will be carried out.

Charles Wilcocks.

MONOD, T. En marge des problèmes médicaux africains. [Problems Ancillary to Medicine in the African.] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 15/16, 280-85.

A survey of the objects of the *Institut Français d'Afrique Noire*, which concerns "the African and the medium in which he lives". An interesting account of the biological and sociological approach, which should be read in the original.

H. J. O'D. Burke-Gaffney.

BLANC G. De l'utilité des connaissances zoologiques pour l'étude expérimentale des maladies exotiques [The Value of Zoological Knowledge in the Experimental Study of Tropical Diseases] *Bull. Acad. Nat. Méd.* 1947 v 131 Nos 15/16 276-9

CALIFORNIA MOSQUITO CONTROL ASSOCIATION. Proceedings and Papers of the Fifteenth Annual Conference of the California Mosquito Control Association held at Agriculture Hall, University of California, Berkeley, California, December 13-14, 1946. 154 mimeographed pp. 9 figs.

Much of the material contained in the proceedings of this Conference is largely of local interest but there are a number of useful papers and notes on the recognized larvicides and mosquito control measures generally. Other subjects dealt with include arthropod borne virus encephalitis, a full and useful description of the structure and scope of the U.S. Public Health Service Communicable Disease Centre illustrated with maps and diagrams and some account of recent literature relating to insect borne disease by Professor W. B. HERMS, Eminent Professor of Parasitology University of California.

H. J. O. D. Burke Gaffney

HUMPHREYS F. A. & CAMPBELL A. G. Plague, Rocky Mountain Spotted Fever, and Tularemia Surveys in Canada. *Canadian J. Pub. Health* 1947 Mar v 38 No 3 124-30.

In 1938 the Dominion and Provincial Departments of Health of Canada initiated surveys on plague, Rocky Mountain spotted fever and tularemia. This paper represents the results of eight years work of this survey in Western Canada.

The survey covered southern Alberta and British Columbia and southern Saskatchewan later including minor surveys in the ports of Halifax (Nova Scotia) and Saint John (New Brunswick) and also areas adjoining army camp in the three Prairie Provinces.

Plague. Rodents (except mice) were dissected in the field and suspicious lesions removed later including minor surveys in the ports of Halifax (Nova Scotia) and Saint John (New Brunswick) and also areas adjoining army camp in the three Prairie Provinces. A tissue pool of five or more animals was taken and the macerated tissue transferred to guinea pigs either by scarification or by subcutaneous injection of filtrates in saline. The latter method is preferable but is only indicated when the tissues are fresh as otherwise the material is toxic to guinea pigs.

Fleas were dealt with in lots of 100 which were ground as one specimen and injected into guinea pigs in saline suspension where *P. pestis* was present. The infection found at autopsy was passed to another guinea pig and to one or two white rats and cultures were obtained.

No evidence of plague has yet been found in British Columbia in Alberta. Two of 356 flea pools from 7,443 ground squirrels yearly from 1939-1942 and again in 1945 ex of 817 tissue specimens and 32 of 939 flea specimens were positive. It is now known that an area of many thousand square miles in south east Alberta is infected.

The infection was found in Saskatchewan in Richardson ground squirrels for the first time in 1946 in an area adjacent to the infected part of Alberta. Two of 356 flea pools from 7,443 ground squirrels were positive.

Species of rat fleas were determined in each area and the cheopis index indicating that *Xenopsylla cheopis* was fairly abundant but this species was not found in other cities on the British Columbia coast. Of the rats found 95 per cent were *R. norvegicus*, 4 per cent *R. rattus* and 1 per cent *R. rattus alexandrinus*. It is noted that the black rat (*R. rattus*)

rattus) was found at Nelson, B. C., some 500 miles from the coast, in addition to water front areas.

No plague infection has yet been found in mice during the course of the survey. It is evident from this survey that plague is well established in ground squirrels in south-east Alberta and that it has now gained a foothold in neighbouring Saskatchewan. So long as the infection is confined to ground-squirrels, which do not ordinarily come into close contact with the human family, the risk is not great; but if rats invade the area and become infected, the problem will be serious. Rats were at one time unknown in the Prairies, but are now well-established in the larger municipalities of Manitoba and Saskatchewan, though they do not yet seem to have colonized to any extent in Alberta. Rats have been prevalent on the west coast of British Columbia since the earliest times.

Rocky Mountain Spotted Fever. Three of the ticks known to occur in Canada are proved vectors of this disease, namely (1) the Rocky Mountain wood tick (*Dermacentor andersoni*), common in a recognized area in the south of the three western Provinces, (2) the American dog tick (*D. variabilis*), found in south-eastern Saskatchewan, Manitoba and in some parts of the eastern territory; and (3) the rabbit tick (*Haemaphysalis leporis-palustris*), distributed throughout Canada, but found only on rabbits and certain birds. Infected rabbits carry a very mild strain of rickettsiae, it is suggested that the rabbit tick provides a source from which virulent strains of *R. rickettsii* may arise.

The only tick known to harbour virulent *R. rickettsii* in Canada at present is *D. andersoni*: evidence of its infection was found in five lots of 72,227 ticks in British Columbia and ten of 49,201 in Alberta; all ticks from south-west Saskatchewan proved negative, although a few cases of the disease have been reported from there.

The authors discuss the difficulties surrounding the interpretation of tests for infectivity in ticks. Frank infections have rarely been induced in test animals, but positive immunity tests were frequent; these were open to doubt as immunity was also demonstrated in control animals. It is suggested that failure to recover *R. rickettsii* from ticks should not be relied upon as an indication that the area concerned is free of infection; it may be that strains which are mild and latent in guineapigs might prove highly pathogenic for human beings.

Tularaemia: In the course of the preceding investigations, a constant watch was kept for the presence of tularaemia, in view of its insidious and highly infectious nature. The disease seems to be widespread in the Western Provinces: in this survey, it was found 33 times. Alberta accounted for 29 of the findings, British Columbia for 7 and Saskatchewan for 2. The commonest host was *D. andersoni*, but the organism was also found in other ticks, in ground squirrels, rabbits, mice and a bird. The infection was found recently in a house mouse (*Mus musculus*) in the coast area of British Columbia where the disease had not been recorded before: this is apparently the first recorded spontaneous infection in the house mouse in the American continent; the *Br. tularensis* in question was very virulent for white mice, but relatively low in virulence for guineapigs; it was quite atypical until it had been passed frequently through laboratory animals.

H. J. O'D. Burke-Gaffney.

[August 1947]

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do Bom Jezus in the Bay of Guarnabara where it remained as the National (or Imperial) Hospital for nearly another decade. Complants here too were frequent. The water was not only insufficient it was very liable to pollution not only aggravating the terrible disease from which they all suffered [leprosy] but spreading other grave diseases. Dysenteries constipation inflammation of the liver and stone in the bladder. Administration difficulties arose patients absconded charges of tyranny and ill treatment were made (but on investigation shown to be unfounded and put forward falsely by malcontents). Finally the decision was reached to make yet another move and it was resolved to reopen the old site at Sao Christovao the housing plans had run full circle and in August 1832 the lepers returned to their first home. By decree the support of the afflicted by voluntary contribution was replaced by a Government grant for their maintenance. Naturally the local residents protested against the return of the lepers but their protest came too late six months after the transference had taken place. The appeal was nonetheless brought up for discussion and consideration at a session of the Rio de Janeiro Medical Society in 1833. This Society has had an honourable and prosperous career. Later it became the *Imperial Academia de Medicina* and its publications appeared as the *Revista Medica Brasileira* at first later under other names between 1849 and 1906 when it was denominated *Boletim da Academia de Medicina* a title which it still retains. Some of the fruitful discussions at meetings of the Society are recorded and *verbatim* reproductions of some of the papers read are included in this book. Other interesting matters are as addenda to chapters II & copies of important hitherto unpublished documents from the Colonial Historical Archives at Lisbon detailing the Proceedings of a Medical Congress held at Rio de Janeiro in May 1840 a plan for leprosy prophylaxis testing of new drugs Sipod Onca and Cashew of the use of snake venoms and lastly *Carpotroche brasiliensis* the Brazilian chaulmoogra which alone of all of them has fulfilled some at least of its expectations.

The work is embellished not only by *verbatim* records of correspondence by facsimile reproductions of many of the letters and decrees and by photographs excellently reproduced. The paper is good margins wide and the print clear. To sum up The author has made the utmost use of the opportunity which his position has afforded him of being able to study documents inaccessible to most and the result is a volume of surpassing interest to the historian of tropical medicine.

H Harold Scott

DAWES Ben (D Sc (London) ARCS DIC FLS Lecturer in Zoology at King's College University of London The Trematoda With Special Reference to British and other European Forms PP vii+644 81 figs 1946 Cambridge University Press [52 6]

This detailed study of Trematoda of representative animals from the European fauna will be welcomed by students teachers and research workers zoology as well as by specialists in helminthology. The account of the Trematoda of medical importance in the tropics is necessarily limited and is mainly to be found in the chapter on Some Trematoda of Mammals which contains brief references to the species occurring in man J J C Buckley

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[No. 9.]

THE TOXICITY OF MEPACRINE IN MAN.
By G. M. FINDLAY, C.B.E., M.D., D.Sc., M.R.C.P.,
General.

The pharmacology and therapeutics of mepacrine are now largely of historical interest; but its toxic effects still require some attention, since they may involve claims for compensation or pension. Single doses of 1.0 to 1.5 gm. have often been given without untoward effect, while larger doses of mepacrine have occasionally been taken either in error or with suicidal intent (BARBOSA 1934, FOY *et al.* 1936). BURNHAM (1946) recorded a case where a man took 90 grains (6.0 gm.) in an attempt at suicide: recovery was complete and no apparent signs of liver damage remained. MARKSON and DAWSON (1945), also, reported the case of a patient who, after taking 0.7 gm. of mepacrine weekly for 16 months as a suppressive, swallowed 250 tablets (25 gm.) with suicidal intention. Ten minutes later, he began to vomit and suffered from diarrhoea; he then became weak and drowsy. When he was found three hours later he was collapsed and stuporose; the skin was cold and clammy, the pulse barely perceptible, the pupils contracted and all tendon reflexes were highly active. The plasma mepacrine concentration was 906 μ gm. per litre. On the second day it had fallen to 90 μ gm. per litre. At no time was mepacrine found in the cerebrospinal fluid. The urine contained no albumin, bile, sugar or acetone. The patient was given adrenaline, 2 pints of 30 per cent. of glucose saline, and 5 mgm. of riboflavin intravenously; in twenty-four hours he had recovered. WRIGHT and LILLIE (1943), however, found that in rats given 80 mgm. mepacrine per kgm. of body weight the toxic effects were not reduced by a daily dosage of riboflavin, 5 to 10 mgm. per kgm. of body weight.

Occasionally, in patients who are given therapeutic doses of mepacrine, there are symptoms of nausea associated with abdominal discomfort (GREEN 1932, CHOPRA *et al.* 1933, SCHULEMANN 1935, HOOPS 1935). Among 49,681 cases which were treated with either prophylactic or therapeutic doses of mepacrine, however, BISPHAM (1941) found only 38 in which there were severe symptoms, vomiting, diarrhoea, anorexia, epigastric or precordial pain and restlessness.

During the war of 1939 to 1945, when mepacrine was taken as a suppressive by large numbers of troops, mild symptoms referable to the abdomen were common during the first ten to fifteen days of suppressive therapy, when nausea,

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eyelids. In some patients the lesions are predominantly lichenoid in others most of the plaques are eczematoid. Many patients have at some time both violaceous hypertrophic lichenoid plaques and some form of cutaneous eczema. During the course of the disease a considerable number of these patients suffer from acute explosive generalized exacerbations manifested by oozing eczematoid dermatitis especially on the flexor surfaces of the limbs, the groins, axillae, extremities and neck. Such exacerbations merge into a true secondary exfoliative dermatitis quite as severe as that seen in primary exfoliative dermatitis.

At the onset the first appearance is usually that of localized violaceous or erythematous eczematoid plaques on the dorsal surface of the hands or feet, the upper part of the back, or on the sides of the neck, ears, nose and around the mouth. The plaques often appear first as tiny follicular papules 1 to 2 mm in diameter, later coalescing to form the violaceous plaques 2 to 5 mm in diameter. These plaques in turn fuse to form thick plates of violet gray desquamating skin up to 30 cm in diameter and sometimes as much as 1 cm thickness. The tops of the lesions are flat and Wickham's striae are frequently seen later the tops are covered with fine adherent silvery scales (AZEMORE *et al* 1946). The soles and palms are often hyperkeratosis of the back and bleed on motion. BARKER (1947) has noted hyperkeratosis of the palms and soles as the only symptom. The lesions were symmetrical and disappeared slowly as the yellow colour of the skin decreased. BAGBY (1945) has described five cases in which pustules were replaced in healing by true lichen planus. The polygonal shiny lesions characteristic of true lichen planus did not occur. After the appearance of the initial lesions there was usually a generalization over the whole body though not infrequently the middle zone of the trunk was exempt. The parts most severely affected were the legs, forearms, dorsal surfaces of the hands and feet, face and eyelids, buttocks, the sternum and neck and the genitalia. Lesions were particularly liable to develop at the sites of trauma and on areas recently affected by tinea or scabies. The site of the initial lesions in 302 patients is shown in Table I. In addition to the lichenoid plaques some patients more rarely showed lesions resembling psoriasis or even pityriasis rosacea. Lesions of the mucous membranes also appeared with blisters and ulcers in the mouth, fissures on the lips and at the corners of the mouth and rawness on the edges of the tongue. The mucosa of the vagina or rectum was rarely involved but BUTLER (1947) has described lesions resembling condylomata on the genitalia and in the perianal region.

The histological changes present in the skin have been very fully investigated by ROSENTHAL (1946). Three stages which merge into each other may be distinguished. The main features are the hyperkeratinization and plugging of the openings of the hair follicles, the degenerative and liquefactive changes in the basal layer and the presence of infiltrating cells in the papillary and subpapillary connective tissue around the hair shafts, hair follicles and cells of the dermal glands. The number of the invading cells, histiocytes, lymphocytes and eosinophiles with very few polymorphonuclear leucocytes and plasma cells depends on the severity of the disease. The changes in the basal are somewhat patchy and vary in different regions. They are best seen in the acute stage but even then they may not be distinguishable from the other dermatoses. There is no vascular or collagenous change other than accompanying acute inflammation. Oedema is frequently seen in the acute and subacute stages both extracellularly and intracellularly in the cell and basal layers as well as in the upper layers of the corium. Of sebaceous glands and infiltration around sweat glands are frequent the changes noted the one that is common to all stages is the less

TABLE I.
The site of the Initial Lesion in Lichenoid Dermatitis.
(BAZEMORE *et al.* 1946.)

Location	No. of cases	Percentage of cases
Hands and wrists	103	33.7
Feet and ankles	72	23.8
Legs	49	16.2
Groin	12	4.0
Arms	11	3.6
Thighs	9	3.0
Eyelids	8	2.3
Ears	5	1.6
Lips	5	1.6
Face and scalp	4	1.6
Chest	4	1.3
Axillae	3	1.0
Mouth	3	1.0
Abdomen	3	1.0
Neck	3	1.0
Scrotum	3	1.0
Other sites	3	1.0

basal layer - this layer of the epidermis is the last to return to normal when the disease has subsided. An outstanding feature is the aggregation of pigment in the papillary and subpapillary connective tissue. These collections of pigment are specially seen in the acute stages, most characteristically at the tip of the papillae, but frequently also in the subpapillary connective tissue; the pigment is found either within macrophages or scattered in the connective tissue. It gives negative reactions for haemosiderin or haemofuscin but positive tests for melanin. The pigmentation is not limited to the acute stage but is found in appreciable amounts even in the papillary or subpapillary connective tissue. The normal pigment of the basal layer is generally increased.

Other forms of dermatitis.—In addition to the lichenoid lesions, a condition of eczematoid dermatitis has been seen in persons taking suppressive mepacrine. Bilateral symmetrical, violet-tinged, vesicular, eczematoid or oozing plaques occur and these involve more especially the hands, arms, feet, legs and less commonly other parts of the body. The nail-bed and skin of the nail-folds are frequently affected, resulting in exfoliation of the nails without true suppurative paronychia. The term 'symmetrical eczematoid dermatitis' has been applied to this condition (*Medical Consultants Division Rept., U.S.A.* 1945). The lichenoid and the eczematous conditions may frequently be combined in the same patient. While a broad division may be made into those lesions that are raised above the skin surface and those that are not, it is possible to distinguish the following types, which together make up the mepacrine-dermatitis complex.—

- (1) A non-weeping form, with the primary characteristics of a lichenoid dermatitis.
- (2) Eczematous dermatitis.
- (3) Combined lichenoid and eczematous dermatitis.
- (4) Pustules replaced in healing by lichenoid lesions.
- (5) Exfoliative dermatitis secondary to (1) to (4).
- (6) Primary exfoliative dermatitis.
- (7) Hyperkeratosis of the palms of the hands and soles of the feet.

number of secondary complications have been described. There is usually loss of body hair while the scalp hair shows a condition recalling alopecia areata. When the hair returns it is often darker than it was before. KZEWOORE *et al.* (1946) describe one case where the hair was at first white but later returned to normal. Total alopecia has occurred. When no hair is lost groups of follicular papules may be seen on the hair scalp. Itching is sometimes severe and is not necessarily related to the severity of the lesions. In some instances a prodromal stage was noted in which intense itching was present in the absence of lesions. Pruritus also did not correspond with the severity of the condition. Nervous phenomena occasionally occurred, sharp shooting pains were present in the legs, patches of anaesthesia and paraesthesia in the skin and in rare instances disturbance of vision with contraction of the visual fields. Polyn neuritis has also been seen. Mental depression was not infrequent while BUTLER (1947) among 247 cases describes three in which there were hallucinations and delusions. Secondary bacterial infection with pustules or abscesses sometimes with the formation of septic ulcers was seen in about 10 per cent of cases and the lymph nodes more especially those in the inguinal region often exhibited a non suppurative adenitis. Lymphangitis has occurred. Staphylococci and streptococci diptheroids and coliform organisms have been isolated. Infection of hair follicles both superficial and furuncular was common the usual organism being *Staphylococcus aureus*. Some patients were sensitive to light. Anorexia and diarrhoea were sometimes present, in one patient blood was passed *per rectum*. Most patients lost weight, decrease of 10 to 30 lb (4.5 to 13.5 kgm) being not infrequent. A low grade fever was often present. Depigmentation or hyperpigmentation with deposits of melanin and atrophy of the skin were also encountered. In a negro patch of vitiligo developed. Diffuse follicular accentuation and loss of or changes in upper part of the back, shoulders and extremities also occasionally developed. The nails were sometimes seen. Telangiectasia also occasionally developed. Simple anaemia was not uncommon and in a few patients aplastic anaemia occurred. BERESTO and SASLAN (1946) described one patient who in the course of an exfoliative dermatitis showed symptoms of glomerulo-nephritis with albumin red blood corpuscles and granular and pus casts in the urine. The skin became a dark coffee-colour and a profound anaemia developed (haemoglobin percentage 28.10 000 per cmm). A high eosinophil count up to 54 per cent was sometimes encountered in the absence of helminthic infection or Löffler's syndrome. As a rule liver function tests revealed no abnormality. A number of other complications have also been seen in association with the mepacrine dermatitis complex, but it is doubtful whether there was any causal relationship. Pericarditis hepatitis atypical pneumonia ascites and oedema have all been recorded. In some cases death has occurred. BUTLER (1947) records a fatal case in which death took place three months after the last dose of mepacrine. In this instance degenerative changes were found in the myocardium.

During convalescence recurrent attacks of proderma superimposed on the flattening lichenoid lesions may develop while thrombophlebitis has sometimes been seen. The relationship of the skin lesions to mepacrine was suggested at an early stage. SENEAR *et al.* (1943) had reported skin lesions of a lichenoid type in a husband and wife who had used mepacrine as a suppressive for a considerable period while MOOJIN and CALLAWAY (1942) had incriminated mepacrine as the cause of an exfoliative dermatitis in a diabetic patient. DUELLING (1945) also suggested that mepacrine was a causal factor in the cases of exfoliative dermatitis seen by him in the south western Pacific area.

The arguments which have been put forward in favour of the view that mepacrine is a causal factor in this symptom complex are as follows:—

- (1) The syndrome has been seen in all areas where large bodies of troops have taken mepacrine as a malarial suppressive.
- (2) Those persons who have taken more than 0.7 gm. of mepacrine a week appear to have been more liable to develop the syndrome than those who have not exceeded this dosage.
- (3) When in 1943, in the south-west Pacific area, the dose was increased to 0.7 gm. weekly, and discipline was enforced to see that this dose was taken, the incidence of the disease increased.
- (4) Only 20 per cent. of those affected developed lesions within 3 months of beginning mepacrine therapy. In 80 per cent. the lesions had developed in 7 months.
- (5) Some, but by no means all, patients failed to improve until mepacrine was stopped.
- (6) Re-administration of mepacrine caused a late chronic lichenoid reaction identical with the original lesions in 19.3 per cent. of cases (BAZEMORE *et al.* 1946).
- (7) On experimental re-administration of mepacrine to 46 patients with lichenoid eruptions, exacerbations occurred in 9, in 6, the re-involvement was extensive and in 3 only a few lesions were seen. The earliest relapse of lichenoid lesions occurred in 23 days and the longest in 97 days. In the majority of cases, the time of relapse was between 40 and 63 days. The exacerbations of atypical lichen planus on experimental re-administration occurred in the same frequency within three months as they had on initial ingestion of the drug (BAZEMORE *et al.* 1946).
- (8) Lichen planus has occasionally been recorded after the long-continued administration of bismuth or arsenical preparations.

The evidence which suggests that mepacrine is not the primary factor in the production of the lichenoid eruption is as follows —

1. The prevalence of atypical lichen planus was far greater in the south-western Pacific area among American troops than in other groups.
2. Many patients, despite lichenoid eruptions, continued to take 0.1 gm. mepacrine daily, but nevertheless improved.
3. Improvement took place when the patients were sent to Australia or the United States, but relapse occurred when they returned to the south-west Pacific area.
4. In 80.7 per cent. of patients, re-administration of mepacrine failed to produce a recurrence of lichenoid lesions.
5. In 37 out of 46 patients with lichenoid lesions, re-administration of mepacrine caused no exacerbation and most of the relapses occurred between 40 and 63 days after again taking mepacrine.
6. The application of mepacrine as a wet dressing did not increase the severity of the lichenoid lesions (EPSTEIN 1945).
7. It is stated by BUTLER (1947), but otherwise unconfirmed, that a similar disease was known to Filipinos before the war.
8. Attempts to demonstrate sensitivity, either by patch tests or by passive transfer tests, were unsuccessful in most of the patients who had lichenoid eruptions (PETERKIN and HAIR 1946, NELSON 1947).

It must, therefore, be confessed that the aetiology of the lichenoid eruption is still obscure. No fungi or bacteria of aetiological significance have been isolated, and attempts to demonstrate a virus by inoculation of biopsy material into embryonated eggs have yielded no results. It is possible, however, that a virus may have been the cause of the lichen planus, infection occurring only

in patients whose tissues have been made susceptible to it by previous administration of mepacrine bismuth or arsenic

The cause of the eczematous dermatitis on the other hand is simply a drug sensitivity similar to that described before the second world war among those who had to handle mepacrine. Patch tests are as a rule positive in cases of this nature while re administration of mepacrine is followed by the reappearance of symptoms after a short interval. BECKER (1946) for instance saw two patients who had recovered from eczematous dermatitis due to mepacrine in the Pacific area. When on leave in the United States they developed attacks of malaria and were given therapeutic courses of mepacrine. Within 24 hours both patients had developed skin lesions in one instance urticarial in the other of the vesiculo bullous eczematoid type. HARVEY *et al* (1944) working in New Guinea reported an exacerbation of lesions in from 24 to 72 hours in 7 of 9 patients after administration of the drug. In each patient the exacerbation was described as oozing or crusted and not of a lichenoid nature.

Thus the mepacrine dermatitis complex contains at least two separate conditions. the eczematous dermatitis is due to drug sensitivity in the aetiology of the lichenoid condition mepacrine probably plays some part but its exact rôle is still uncertain. The eczematous dermatitis can occur and become extremely severe with small doses of mepacrine and at a very low plasma concentration. In this group positive reactions to patch tests with mepacrine are to be expected. The second type is localized and morphologically resembles lichen planus. Prolonged administration of the drug is apparently necessary to elicit this reaction. In this connexion it may be of interest to note that FORMAN (1947) has recently emphasized the frequency with which lichenification of the skin is associated with anxiety states and hysterical traits or with depression.

Treatment of skin lesions—The treatment of the lesions associated with the mepacrine dermatitis complex is unsatisfactory. Mepacrine must be stopped although in some patients no improvement may occur until they have stopped taking the drug for 2 or 3 months. Some patients who ceased to take mepacrine failed to improve till penicillin had been administered. Neither thiothymol arsenical preparations nor large doses of vitamin A caused any improvement (BAZEMORE *et al* 1946). WILSON (1946) believed that deficiency of vitamin A was a predisposing cause while in view of the fact that lesions similar to those of riboflavin deficiency may be seen and that mepacrine may

(1947) to have been living on a diet deficient in fresh vegetables milk and meat. Other observers however state that the diet was excellent (ROSENTHAL 1946). It may be noted that as SCUDL and HANLIN (1944) and FITZ HUGH *et al* (1945) have pointed out a high protein low fat diet reduces the toxicity of mepacrine in rats especially in relation to the extent of the liver lesions. Bland non irritating solutions such as 1:9000 potassium permanganate solution soaks may be of value. Sulphonamide ointments tincture of iodine and mercurial ointments should be avoided. As some patients appear to be sensitive to light exposure to sunlight must be avoided.

It would be interesting to know whether any persons who have developed lichenoid lesions while taking mepacrine subsequently show a recrudescence of the lesions after prolonged therapy with either bismuth or arsenical preparations.

(ii) *Toxic psychoses.*

Very shortly after mepacrine had been introduced, reports began to appear of toxic psychoses and other nervous phenomena which were attributed to its use. In some cases, as in those described by CHOPRA and ABDUL WAHED (1934), DECHERD (1937), CHOREMIS and SPILIOPOULOS (1938), and AYALA and BRAVO (1942), mepacrine had been combined with pamaquin and there was some uncertainty whether the nervous symptoms were due to one or other of these drugs or to their combination. KINGSBURY (1934), however, with two years' experience in Malaya, was able to collect 12 cases; others were added by GREEN (1934 a and b). One case was reported from India by GOVINDASWAMY (1936) while from China, KANG and JARVIS (1936) recorded one case and WILKINSON (1939) three others. The malarial epidemic in Ceylon, when soluble mepacrine (atebrin musonate) was extensively used intramuscularly, in addition to mepacrine by mouth, provided a considerable number of cases (BRIERCLIFFE 1935, UDALAGAMA 1935, HAY *et al.* 1935). Reports before 1939 had rather suggested that mepacrine psychoses were more common among members of Eastern races than among those of European extraction. ALLEN *et al.* (1937), however, reported 9 cases among persons given therapeutic malaria in America, BISPHAM (1936 and 1941) observed one case, and LERRO (1941) in Panama also recorded a case. SHEPPECK and WEXBERG (1946) subsequently described 19 cases seen between 1935 and 1943 in the Gorgas Hospital, Panama.

The incidence of psychoses due to mepacrine is extremely low as is shown in Table II. It will be seen that the numbers tend to be highest among those who were given malaria therapy for cerebral syphilis and subsequently treated with mepacrine, as well as among those groups where soluble mepacrine was given intramuscularly. Among specially selected persons, such as European troops in West Africa, the incidence was extremely low in those treated with

TABLE II.

The Incidence of Nervous Reactions following Administration of Mepacrine.

No. of persons given mepacrine	No. with nervous involvement	Incidence per 1,000 cases	Observers
30,000	35	1.16	LIOZ & KAHN (1946)
20,000	2	0.1	NIETO-CAICERO & GUERRERO (1946)
11,584	3	0.25	FINOLAY (1947)
9,000	4	0.44	HOOPS & BARROWMAN (1938)
7,604	35	4.6	GASKILL & FITZHUGH (1945)
4,876	19	3.9	SHEPPECK & WEXBERG (1946)
1,628	6	3.6	FIELD (1938)
1,207	1	—	HOOPS (1935)
750	2	2.66	GREEN (1934)
† 644	7	10.8	UDALAGAMA (1938)
500	0	0	FIELD (1938)
422	1	2.3	BISPHAM (1938)
450	4	8.8	VOLLMER & LIEBIG (1944)
* 300	5	16.6	READ <i>et al.</i> (1946)
† 203	2	9.8	FIELD (1938)
Totals 89,168	126	1.4	

* Therapeutic malaria for neurosyphilis.

† Soluble mepacrine and mepacrine *per os*.

therapeutic courses of mepacrine while among approximately 30 000 Europeans taking 0.1 gm mepacrine from March 1943 to March 1946 there were no cases of toxic psychosis. The high incidence reported by UDALAGAMA (1935) in Ceylon may be due to the fact that he included all states of depression following mepacrine administration these may or may not have been due to the drug.

Mepacrine psychoses usually though not invariably begin after the fever has abated and parasites have disappeared from the blood stream. Symptoms have been noted as long as 12 days after cessation of mepacrine therapy, but the interval is usually shorter. GASKILL and FITZ HUGH (1945) found the onset most common 6 days after treatment had ended though some patients developed symptoms on the third day after having taken 0.9 gm by mouth. SHEPPECK and WEXBERG (1946) in their series of 19 cases found that the average interval between the disappearance of fever and the onset of psychosis was 2.2 days the median 2 days. The average interval between the disappearance of parasites and the onset of psychosis was 2.6 days the median 2 days. BRIERCLIFFE (1935) noted that when mepacrine was given by mouth, mental symptoms usually began at the end of 5 days with intramuscular injections the onset would be shortly after the first or within 24 hours of the second injection.

The symptoms associated with mepacrine psychosis vary. States of manic or hypomanic excitement with euphoria are most common. Probably those cases labelled cerebral excitation by some of the earlier observers fall into this group. Some patients become so stimulated mentally that they write poems composed music or paint pictures. Delirium visual hallucinations combined with an otherwise catatonic condition schizophrenic like symptoms, paranoid syndromes and acute confusional states have all been reported while depression and in one instance prolonged coma have been noted (BECKMAN 1942). Women may suffer from sexual excitement and delusions of having been raped. Disorientation as to time place and person is not uncommon, while a fine tremor has been observed (MERGNER 1945). The mental integration of the patient would seem to be of importance in determining the type of psychotic reaction though it may not have anything to do with initiating the condition.

The onset is usually sudden but in a few cases it may be preceded by a short period, a day or less of nervousness malaise restlessness or insomnia. When the onset is insidious loss of memory for recent events may be well marked the patient becoming withdrawn and secretive. The psychosis develops rapidly to a climax within a day or even less and remains at its height for a period varying from one day to five weeks. As a rule there is rapid subsidence of symptoms. SHEPPECK and WEXBERG (1946) found the average duration of symptoms to be 8.5 days the median 2.5 days. The outcome is very generally complete recovery but there may be difficulty in concentrating or in remembering for some time while the speech is rather slow. In the series of cases recorded by GASKILL and FITZ HUGH (1945) 33 of 35 cases completely recovered in from 8 to 85 days the average being 23 days. Two patients who developed schizophrenia did not recover. Some fatal cases have been recorded. One patient while in a state of profound depression a fatal psychosis developed after 2.4 gm mepacrine had been given to a patient who was apparently suffering from undiagnosed dementia paralytica. A third patient after receiving 3 gm of mepacrine developed a subacute toxic delirium associated with fever, two days later death took place with hyperpyrexia after a further 13 days. There is no constant relationship between the dose of mepacrine and the liability to develop symptoms since toxic psychoses have been seen after

as little as 0.5 gm. SHIERS (1946), for instance, reported a case of marked cerebral excitement after very small doses, the attacks returning whenever mepacrine was given. WHITMAN-NEWELL and LIDZ (1946) believe that mepacrine psychoses rarely occurred when doses not exceeding 2.8 gm. were given as treatment in 7 days. When massive dose schedules became popular later, the incidence of toxic psychoses increased. LIDZ and KAHN (1946) found that psychoses were not uncommon when 3.8 to 4.8 gm. were given in 7 days or 1.4 gm. in 24 hours. This is in agreement with the finding of the Malaria Commission of the League of Nations (1937), who believed that the incidence of psychoses increased with large doses, with the length of the period over which mepacrine was given, and with the use of a tetrin musonate. ALLEN *et al.* (1937) suggested that a relationship existed between the dose of mepacrine per kgm. of body weight and the duration of symptoms. The correlation, however, is not very exact, for while 4 patients who took more than 25 mgm. per kgm. of body weight had symptoms of over 10 days' duration, 2 patients who had symptoms lasting more than 10 days had taken only 19.1 and 24.1 mgm. per kgm. of body weight. GASKILL and FITZ-HUGH (1945) gave mepacrine to 16 patients who had recovered, without untoward result in 15, one patient became mildly excited. In the case reported by SHIERS (1946) the symptoms returned when mepacrine was readministered.

Very rarely, and particularly in small children, acute forms of polyneuritis or myeloradiculoneuritis have been ascribed to the taking of mepacrine. Two cases have been described in Italians (MOSCHINI 1935 and VALENTINI 1937) and six in Greek children by CHOREMIS and SPILIOPOULOS (1938), associated with polyneuritis and paralyses of the lower limbs. It must be remembered that a very similar neurological picture has been recorded in patients suffering from malaria and treated with quinine, the question therefore arises whether mepacrine is the main factor in the aetiology of the polyneuritis. In the case of an adult treated with mepacrine LERRO (1941) observed paraesthesia over the whole body, nausea, vomiting and a choking sensation. Epileptiform fits are reported by VARDY (1935), FIELD and NIVEN (1936) and SIEGENBEEK VAN HEUKELOM and OVERBEEK (1936), a matter of some interest, as, according to MOLTOR (1941) clonic convulsions are produced in animals by large doses of mepacrine. VAN SLYPE (1936) observed three cases of convulsions in children and one case of bulbar paralysis with flaccid paralysis of the lower extremities. Very little is known of the mechanism by which mepacrine brings about these nervous lesions. Riboflavin deficiency is not associated with nervous phenomena, so that a sudden interference with riboflavin metabolism by mepacrine is not a probable cause. As the African diet is very often deficient in riboflavin, the administration of mepacrine to Africans should result in a high incidence of psychotic reactions if this theory were correct: this certainly was not noticeable among African soldiers treated with mepacrine. The symptoms are not those of cerebral malaria nor do they bear any relationship to a Herxheimer reaction, which might equally be due to destruction of malarial parasites by other antimalarial drugs. It seems probable therefore that the psychosis is due to a direct interference with the metabolism of the nerve cell by mepacrine. In animals, HECHT (1933) found evidence of cerebral stimulation after lethal doses. MOLTOR (1941) states that, occasionally, high concentrations of mepacrine are found in the cerebrospinal fluid; but no mepacrine was present in the cerebrospinal fluid of the patient with acute poisoning described by MARKSON and DAWSON (1945). Certain experiments by MANIFOLD (1941) are of interest in this connexion. Various acridine dyes not, however, mepacrine were tested for their action on the carbohydrate and pyruvate oxidation systems of brain tissue *in vitro*. Acridiflavine was found to inhibit oxidation in high concentration, the action suggesting a breakdown in carbohydrate metabolism.

similar to that found in the absence of aneurin this provides a possible explanation for a certain similarity between the psychiatric pictures caused by mepacrine and by a deficiency of aneurin. LIPZ and KAHN (1946) have suggested that mepacrine may produce mental impairment without actual psychosis whenever the serum levels are above $18 \mu\text{gm}$ per 100 ml. This was judged by scores on the Kohs Block test in which the mental age is assessed by forming standard patterns with coloured cubes. Thus doses of 2.1 gm in 7 days were without action in causing impairment of the mental faculties while 4.5 gm in 6 days caused a very definite impairment.

It would thus seem that mepacrine psychoses are likely to develop only if the plasma or serum levels are allowed to remain at a consistently high level. The diagnosis of mepacrine psychosis usually presents little difficulty ALLEN (1944) however has drawn attention to a case where the euphoria and delusions of grandeur caused a diagnosis of general paralysis to be made. It should be remembered in this connexion that a recent attack of malaria may cause false positive Kahn and Wassermann reactions.

The value of any particular treatment in mepacrine psychoses is difficult to assess since in so many patients the symptoms subside spontaneously. Treatment similar to that used in alcoholic psychoses has been suggested by SHEPPECK and WEXBERG (1946). This consists of aneurin hydrochloride 50 mgm intravenously four times a day and two compound vitamin B and nicotinic acid 50 mgm three times a day and 25 mgm nicotinamide. It should capsules three times a day by mouth each capsule containing 5 mgm aneurin hydrochloride, 25 mgm riboflavin and 25 mgm nicotinamide. It should however be noted that in rats HEGSTED *et al.* (1945) found that mepacrine retarded the onset of vitamin B₂ deficiency. In addition fluids are given in large quantities and the bowels are kept open. The effects of large doses of riboflavin alone would be of interest while glucose intravenously might be of value since it is known that soluble mepacrine given intravenously reduces the blood sugar.

(iii) Haematopoietic lesions

In rare instances aplastic anaemia, agranulocytosis and acute hepatitis have been seen in association with either the lichenoid-eczematoid syndrome or with exfoliative dermatitis. Similar blood changes have also occurred in those taking mepacrine in the absence of skin lesions. CUSTER (1946) found that in the United States Army the case incidence of aplastic anaemia in areas where mepacrine suppression was in force rose during the years 1943 and 1944 from 0.66 to 2.84 per 100,000 compared with a case incidence of 0.04 to 0.18 in other theatres of war. In 47 cases of aplastic anaemia occurring in those who had taken mepacrine the period of mepacrine suppression varied from 1 to 34 months. The mepacrine dermatitis complex preceded the aplastic anaemia in twenty cases but the dermatological findings were typical of those found in aplastic anaemia. The pathological findings were usually at necropsy in 5 of these cases. Liver lesions were found in 10 patients seen in infective hepatitis. The haematological features were essentially those of normocytic normochromic anaemia with leucopenia and thrombocytopenia. Reticulocytes were usually very scanty. A haemorrhagic tendency was frequently noted early while the subsequent course was almost invariably marked by fever and haemorrhagic phenomena. Four out of 47 patients survived for periods varying from 2 to 7 months. ROSENTHAL (1946) has also described two cases of aplastic anaemia in association with the lichenoid dermatitis. One patient recovered while the other died. At necropsy apart from widespread petechial haemorrhages there was chronic focal myocarditis. The liver showed oedema, periportal degeneration

of the parenchyma and infiltration by lymphocytes and fibroblasts, with localized masses of pigment mostly within macrophages in the periportal regions. The pigment gave a reaction for melanin with Becker's stain. A few cases of agranulocytosis have also been recorded. Treatment is unsatisfactory.

When large doses of mepacrine of the order of 50 to 200 mgm. per kilo of body weight daily were given to rats, mice, rabbits, hamsters, guinea-pigs, dogs, monkeys, chickens and ducks, peculiar basophilic inclusions, usually associated with vacuoles, appeared in the cytoplasm of lymphocytes. Inclusions of a similar nature occurred in the erythrocytes of the rat, mouse and hamster, and rarely in the monocytes of the rat, while "polynucleosis" and lymphopenia developed in other species. The nature of these inclusions is unknown, but they do not appear to be parasitic in nature (MUSHETT and SIEGEL 1946) and nothing like them has been seen in man. RUSSELL (1945) has described an eosinophilia in man as the result of prolonged mepacrine administering. This finding has not been confirmed and was probably due to other causes.

(iv) *Ophthalmological changes.*

A new industrial hazard has been found to occur among those engaged in handling mepacrine in large quantities. Reference has already been made to the occurrence of skin eruptions on exposed parts of the body, puffiness of the eyelids, lachrymation and pain over the frontal sinuses. MANN (1947) has now described a curious corneal condition in 6 male workers handling mepacrine; all had pigmented yellow skin. The patients worked for short periods without goggles, masks or protective clothing in an atmosphere which contained clouds of very fine mepacrine dust. They had no dermatitis, but the conjunctivae also were yellow. After working for some weeks, they all noticed that at night a point source of light had a blue halo round it. One yard (0.9 m.) away the halo began 2 in. (5 cm.) from the source and was about 3 in. (7.5 cm.) wide. It was dark blue at the inner edge and pale blue at the outer edge. At a distance of 6 yards (5.4 m.), faint yellow, green, and reddish-brown bands appeared outside the blue ring. All the men had normal visual acuity.

On slit-lamp examination, the condition of all patients was similar. There was yellow discoloration of the conjunctiva which was barely visible macroscopically. Under magnification there appeared to be an actual deposit of minute dark-brown dots at the exposed margins of the limbus. The whole surface of the cornea was peppered with very fine dust-like particles, which appeared dark yellowish-brown by direct illumination and opaque by transmitted light. The size of the particles was estimated as between 5 and 10 μ in diameter—that is, about the size of the nucleus of a corneal epithelial cell. The corneal surface was perfectly smooth and bright, and the change was present only in the surface layer of cells. In the lower part of each cornea there was a series of wavy yellow lines which were composed of closely aggregated dots, similar to those peppered over the cornea, but closer together and of a bright yellow colour. One patient noticed the haloes after being employed for less than a year; they disappeared within 2 months of a transfer to a different job. Later, he returned to work with mepacrine and the phenomenon reappeared in 6 months, although it did not reach its previous intensity. There was no evidence of glaucoma in any of the patients, and it seems reasonable to attribute the condition to a diffraction effect.

Two male volunteers, who had both taken 100 mgm. of mepacrine by mouth daily for 7 months, showed a pale-yellow staining of the skin generally, but their eyes were normal and they had never seen blue haloes. Mepacrine dust blown directly on to the eyes of rabbits produced in 6 days an appearance on

slit lamp examination similar to that seen in human subjects. These observations suggest that the corneal condition is caused by direct contamination with mepacrine dust. The particles seen may not be mepacrine itself since this is soluble in the tears and the exact nature of the precipitates is doubtful although they are probably an insoluble breakdown product of mepacrine. Histological examination of an affected rabbit's eye was carried out and the yellow granules in the cytoplasm could be seen in unfixed specimens. They were very small and amorphous. The opaque yellow dots seen with the slit lamp are the whole aggregation of these amorphous particles within the cell containing them. It was suggested that they might be composed of 2-chloro-7-methoxyacridone—an insoluble substance which is formed by hydrolysis of mepacrine.

An additional toxic effect on the eyes has been noted by REESE (1946) who gave three patients suffering with oedema of vision was noted in both eyes and examined with a slit lamp showed bedewing of the cornea due to the presence of isolated points of oedema. One patient had taken 0.2 gm for 27 days while the others had high therapeutic doses combined with suppressive mepacrine. When mepacrine was stopped the oedema disappeared but recurred when the drug was re-administered. CHAMBERLAIN and BOLES (1946) similarly recorded four cases three of their patients had taken mepacrine for only four to six weeks in doses of 0.1 gm daily before blurring of vision came on. In one instance the visual acuity was as low as 1/200 in each eye and in all the patients some degree of hepatic dysfunction was noted. The corneal opacities were for the most part situated near the level of Bowman's membrane. It is estimated that at least 25 cases of this type occurred in the Pacific theatre.

Mepacrine and Blackwater Fever

The question whether mepacrine therapy precipitates an attack of blackwater fever is of some interest. It has long been recognized that quinine may be a precipitating factor while pamaquin is also known to give rise to methaemoglobin in the blood and if this is formed in sufficient amounts to the escape of haemoglobin products through the kidney into the urine. Many cases have been recorded where the administration of a combination of pamaquin and atebnin has been followed by haemoglobinuria (BANERJEE and BRAHMACHARI 1933, AMY 1934, VALMAN 1934a, VOIR 1934, MILLER 1934 and CHOPRA and CHAUDHURI 1935). NAGELSBACH (1933) however recorded the case of a woman in labour who developed blackwater fever while taking mepacrine only. The cases recorded by VALMAN (1934b) the patients had mepacrine only. FOY and KONDI (1937) reported 3 cases of blackwater fever where mepacrine had been given but quinine had not been taken for at least three months while GLANTIER (1938) also described one case where blackwater fever appeared to be precipitated by the administration of mepacrine. It is noticeable that blackwater fever developed as a rule either after very small doses of mepacrine in one instance 0.4 gm in 48 hours or after the completion of what would now be regarded as an inadequate dosage (1.5 gm in 5 days) for the treatment of attack of malaria.

HOORS (1935) found that the use of mepacrine in a labour force in Malaya reduced the incidence of blackwater fever. The experience of FRIDLAND, STEVENSON (1944) in West Africa was similar among European troops. Introduction of mepacrine as a suppressive 0.6 or 0.7 gm weekly with mepacrine only in the treatment of malarial attacks 0.8 gm being given in the first four hours completely abolished blackwater fever.

SIEGEL and McSHETT (1944) found that a massive haemoglobinuria was produced in young rats only by giving massive doses far in excess of the

given to man therapeutically. It thus seems that mepacrine is far less likely to precipitate blackwater fever than is quinine.

To concentrate entirely on its toxic reactions is obviously to give an entirely false picture of the results obtained with mepacrine in the treatment and prevention of malaria, for during the war mepacrine was given without ill effect to hundreds of thousands of persons in the services. While it would be an exaggeration to say that mepacrine won the war in the East, there is no doubt that without its aid the sickness rates would have been much higher, the deaths would have been far more numerous and ultimate victory would have been long delayed.

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KARTMAN (p 760) found infection with *W. bancrofti* in 2.18 per cent of *Anopheles funestus* and in 28-54 per cent of *A. gambiae* in the neighbourhood of Dakar.

NEWTON *et al* (p 53) have allowed mosquitoes of 16 species indigenous to America to bite volunteers infected with *W. bancrofti*. Of these *Culex quinquefasciatus* (*C. fatigans*), *C. tarsalis*, *Psorophora confinis* and *Anopheles albimanus* would be excellent vectors under favourable conditions and three other species would be rather poor vectors.

NEWTON and PRATT (p 52) have shown that infective larvae of *W. bancrofti* are capable of migrating from the abdomen to the proboscis of a mosquito. They conclude that infective larvae occurring anywhere in the body of a mosquito are potentially capable of infecting man.

RAO (p 231) found filarial infection only in *Mansonoides annulipes* (=longi palpis) in a village in Central Provinces, India, in which *W. malayi* was discovered.

MICHAEL (p 53) has given a detailed description of the pathological changes which occur in filariasis due to *W. bancrofti*. These may be allergic and transitory, the effects of sensitization or they may be the result of the presence of the worm and consist of thickening and degeneration of the endothelium of lymphatic channels with lymphangitis, oedema, infiltration, fibrosis and varicosity. These lesions are essentially the tissue changes associated with all infectious granulomata plus those due to foreign body irritation. Examination of the blood is not enough for diagnosis; the method of choice is laboratory examination of biopsy material.

ROSE *et al* (p 232) produce evidence which suggests that lymphangitis in the course of filariasis is an allergic phenomenon and that secondary streptococcal infection is of little or no aetiological importance.

WOLFE and SCHOFIELD (p 762) found living *W. bancrofti* adults in a greatly dilated lymphatic vessel in the spermatic cord of an American serviceman who had been stationed in tropical Africa.

DHARAGUDE (p 353) reports further cases of microfilarial granuloma of the spleen from some of the specimens living microfilariae were obtained while were *W. bancrofti*.

RIFKIN and THOMPSON (p 353) describe the pathology of filariasis. Three stages are recognized—the stage of local or general allergic reaction, the subacute stage characterized by proliferative granulation tissue in the lymphatic tissues harbouring the parasite, the late chronic stage of non-specific fibrous tissue overgrowth.

THOMPSON, RIFKIN and ZARROW (p 468) give a detailed description of the clinical and pathological features of the early stages of filariasis, recognizing 3 stages—(1) The early acute phase of sudden lymphangitis and soft swelling of the glands, no microfilariae are found in the blood. (2) The subacute phase without lymphangitis or swelling but with some aching of the part and proliferation of the walls of the lymphatics and of the glands. (3) The early chronic phase again without microfilariae in the blood, there is chronic swelling and generalized reticulo-endothelial hyperplasia with irregular fibrosis. These changes refer to early filariasis; the account should be read in the original series of patients in whom the diagnosis could not be confirmed by recurring attacks of pain in axilla, arm, groin, thigh or scrotum sometimes accompanied by swelling. The glands became enlarged and tender and lymphangitis occurred.

BEHM and HAYMAN (p 762) discuss the diagnosis of filariasis in America. They rely chiefly on troops who have been stationed in the endemic area. They rely chiefly on clinical diagnosis especially a history of one or more attacks of *mumu* (fever).

lymphadenopathy and retrograde lymphadenitis), and state that the intradermal test with antigen from *Dirofilaria immitis* gives too many false positives in uninfected persons, to be useful. Adenopathy alone is of little significance, since it was extremely common in the troops in the Pacific. A similar account of the same patients is also given by BROWN *et al.* (p. 939).
LEEDE and JOSEY (p. 573) discuss the early diagnosis of filariasis, much or the same lines as other authors mentioned in this Summary.
HARRIS and SUMMERS (p. 569) describe a concentration method for microfilariae in the blood, which involves the use of heparin, saponin, and the centrifuge.

OLIVEIRA (p. 940) discusses the surgical aspects of elephantiasis.
OLIVER-GONZÁLEZ and MORALES (p. 471) have prepared antigens, for skin tests in filariasis, from microfilariae of *W. bancrofti* and from *Ascaris* and *Necator*. They found evidence of a group reaction, and that persons with other nematode infections gave positive results, as well as those with filariasis, so that the test is useful only when other nematode infections are absent.
ZARROW and RIFKIN (p. 571) prepared an antigen from *D. immitis* and used it for a skin test for filariasis. They state that in a dilution of 1 in 4,000, positive results due to intestinal worms are not given, but that in filariasis the test was positive in a great majority of cases. Full details must be sought in the original.

GOODMAN *et al.* (p. 573) discuss diagnosis and progress of filariasis in American soldiers. Skin tests with antigens from *D. immitis* and *Setaria equina*, diluted to 1 in 8,000, were positive in just over half the cases, but some controls were positive to this and to a complement fixation test. Microfilariae in the blood were found very rarely. Prognosis is good. WHARTON and STELMA (p. 1054) find that with an antigen prepared from *D. immitis*, and used in a dose of 0.01 ml. of dilution 1 in 8,000, there are some false positive results in persons not infected with filariae, and, on the other hand, that with a dilution of 1 in 100,000, only 80 per cent. of infections are detected. The paper should be read in full.

WARREN *et al.* (p. 1056) found that complement-fixation tests with sera from persons in whom the clinical diagnosis of filariasis had been made, with antigen prepared from microfilariae of *W. bancrofti*, were negative, although similar tests with antigen from adult *D. immitis* were strongly positive. Intradermal tests were positive in about two-thirds, with each antigen. From cross-immunity tests, the authors conclude that each of these filarial species contains a species-specific, and also a group-specific, antigen.

AUGUSTINE and LHERISSON (p. 570) think that, in some parts of the world, man may be constantly exposed to infection with filarial nematodes carried by biting insects, but not pathogenic for man, and that these may create, in a reaction of immunity which complicates reactions to tests in which the antigen is prepared from *D. immitis*. They quote experimental work in support of this contention.

CULBERTSON *et al.* (p. 54) have treated a few patients, in whose blood, microfilariae were found, with Neostibosan for periods up to 48 days. The results were promising, though by no means strikingly good. CULBERTSON *et al.* (p. 354) report further on patients treated with Neostibosan and observed for a year; 13 of 30 had remained free of microfilariae, and in five the numbers were greatly reduced. In controls the infection had not diminished in the same period. In a later report (p. 763) they show that 20 of 35 treated persons lost all filariae in 15 months, and in others the numbers were much reduced. Controls showed no reduction.

LAWTON *et al.* (p. 55) report the results of treatment of dogs infected with *D. immitis*, and cotton-rats infected with *Leishmanoides carinii*, with preparations of mercury and antimony. Some of the latter showed activity against the worms.

ASHBURN *et al* (p 662) have examined *D. immitis* from dogs given treatment with antimony preparations. The drugs apparently caused changes in the ovary, the developing ova and the larvae which ensured at least temporary sterilization of the female worms.

On the assumption that lymphangitis in filariasis is associated with allergy PRATT (p 470) has used adrenaline in treatment with some success in relieving symptoms.

COGGESHALL (p 852) notes that in 1942 more than one-quarter of the United States marines in the Samoan area became infected with *H. bancrofti*. He emphasizes the fact that the early symptoms—lymphangitis, lymphoedema and lymphadenopathy—are unlike the usual descriptions of the disease as it is seen in the Samoan people and he stresses the fact that the signs disappear if the patient is removed from the chance of reinfection. Filariasis cannot establish itself in the United States.

In a study of the psychosomatic aspects of filariasis in American troops ZELIGS (p 53) concluded that the disease soon dies out after the patient is removed from the endemic area. That rehabilitation is best obtained by a combined programme that no impairment of sexual functions has resulted from filariasis and that severe sequelae have occurred in only 0.2 per cent of cases. BUCHANAN (p 231) stresses the fact that elephantiasis occurs only in persons subjected to constantly repeated infection over a period of years. McMARTIN (p 231) also writes in reassuring fashion that permanent disability due to filariasis will be rare in the United States troops who served in endemic areas. He gives indications for treatment of filariasis.

WILLIAMS and BROWN (p 663) show that the filarial worm *Litomosoides caroli* transmitted in cotton rats (*Sigmodon hispidus*) by the tropical rat mite.

WILLIAMS (p 232) describes the life-history of *Litomosoides caroli*. Females migrate to villages (45 is the maximum quoted) living near rivers in the Belgian Congo. In the Belgian Congo females migrate to villages (45 is the maximum quoted) living near rivers in the Belgian Congo. In the Belgian Congo females migrate to villages (45 is the maximum quoted) living near rivers in the Belgian Congo.

WATSON *et al* (p 233) show that in fish from the watercourses of the Congo in which *S. damnosum* breeds the rate of infection with *O. volutulus* may be 100 per cent and that in villages 5 miles away the rate may be 60 per cent. Near the rivers 15 per cent and 5 miles away 3 per cent of the flies were infected. *S. damnosum* is the only known vector in this area.

RIDLEY (p 55) refers to the large amount of blindness which in Africa is due to onchocerciasis. In 300 persons examined for the disease in the Northern Territory of the Gold Coast 136 were found infected and of these 22 were blind or almost blind and visual defects were present in 51. This was probably not a representative group of people. The author makes the point that ocular defects which are sometimes attributed to trypanosomiasis may often be due to onchocerciasis. PACHECO-LUNA (p 1159) states that on the slopes of the Sierra Madre in Guatemala about 20,000 people suffer from onchocerciasis of whom one third show ocular manifestations and 2 per cent are blind. He gives a detailed account of the pathology of the ocular conditions which should be read in full. PING SOLANES *et al* (p 764) in Mexico examined 93 patients suffering from onchocerciasis of these 70 had signs of eye trouble mostly punctate keratitis, corneal opacities and iritis. Lesions of the fundus are rare. The keratitis does not interfere much with vision but the iritis does.

GOLDMAN and ORTIZ (p 664) describe three types of dermatitis associated with American onchocerciasis.

PEEL and CHARDOME (p 1159) have found the adult female of *Agamofila streptocerca* in *Pan paniscus*. Enterobius infestation etc.—SCHUFFNER (p 233) discusses *Enterobius* infection as he has studied it in Amsterdam where all the children appear to be infected.

He has found, by experiments in volunteers, that the length of life of the worm is 37-93 days, and that worms are passed 36-53 days after infection. Dust-borne infection is extremely important; the eggs are derived from the skin of the anal region and may be found in rooms, lavatories and, most important, in bed-clothes. In the absence of re-infestation, untreated infections die out in some 12-27 days. For treatment he advises small enemata to clear the lower

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complete answer. The anus may be closed with suppositories or ointments. [It would be interesting to know if the oiling of bed-clothes would be as effective in this connexion as it is in relation to pathogenic bacteria.]

HUMMELEN (p. 355) has made a survey of intestinal helminthic infestations in part of Holland; *Ascaris* and *Trichuris* were found, and the incidence was related to poverty and rural life. *Enterobius* was also found, in 72-100 per cent. when the examination was made by the pestle method of Schüffner and Swellengrebel.

KUITUNEN-ERBAUM (p. 940) has used phenothiazine in the treatment of *Enterobius* infection, in 408 children and 176 adults. The first dosage proved too toxic, and most were treated with doses up to 7 gm. total (according to age), administered over a period of 4 days; 80-85 per cent. were negative after the first course of treatment; up to 3-4 per cent. needed three courses. Toxic reactions included anaemia (sometimes needing emergency treatment) and certain minor conditions. The drug should be highly purified, and the patient in good health and not constipated; if toxic reactions occur, it should be discontinued. It is more effective than gentian violet, but more toxic. It is futile to treat one member of a family only, since, as a rule, infection runs through a family.

GETZ (p. 57) produces evidence which indicates that massive infestation with *Trichuris* may give rise to serious illness, which may suggest hookworm disease. The signs include diarrhoea, blood-streaked stools, weakness and loss of weight, pallor, fever, emaciation, anaemia and abdominal distension. He describes the findings in four autopsies carried out on children in Panama, in which very large numbers of *Trichuris* were found along the whole length of the large intestine. There may be no characteristic lesions. WHITTIER *et al.* (p. 577) also state that infestation with *Trichuris* may give rise to severe symptoms, of diarrhoea, bloody stools, pain and tenesmus, with loss of weight. They quote cases seen in the Panama Canal Zone.

Trichiniasis, etc.—The incidence of *Trichinella spiralis* in human autopsies in the United States is 16 per cent., and in hogs 1-5 per cent. GOULD (p. 578) discusses control of this infection, and gives his opinion that it can best be effected by the processing of pork products, by heat, or by freezing at about 0°F. He gives reasons why microscopic inspection of pork may fail, and why the cooking of garbage for hog food may be impossible to enforce. A considerable amount of pork products contain living larvae, and unless these meats are properly cooked, they are dangerous.

NEGHME (p. 577) reports trichiniasis in 12-5 per cent. of bodies from hospitals in Santiago, Chile.

PEPPER and DÍAZ RIVERA (p. 356) give an account of the clinical picture and laboratory diagnosis of trichiniasis, laying stress on demonstration of larvae in the blood. They think that this infection may be more common in tropical countries than is at present realized.

GOULD (p. 362) has devised a new type of trichinoscope.

OLIVER GONZÁLEZ (p. 357) has contributed a long paper on the antigenic differences between the larva and the adult of *T. spiralis*. In infected rabbits two antibodies are produced: one against the larva and one against the adult and these give rise to precipitates about the orifices of larvae and adults respectively under suitable experimental conditions. The author discusses his findings in relation to problems of immunity to worm infections but for this discussion the original abstract should be consulted. ROTH (p. 359) has used a serological test for the diagnosis of trichinosis in which larvae from infected muscle are placed in the suspected serum. If the patient is infected precipitates are formed around the orifices of the larvae. Details must be sought in the original but the author writes favourably of the test.

SLESSENGH and KLINE (p. 360) have devised a simple rapid flocculation test for trichinosis in which the antigen is an alkaline aqueous extract of *Trichinella* larvae to which cholesterol is added. If this is mixed with serum from an infected person or pig flocculation occurs which can easily be seen under low power of a microscope. A few results in human trichinosis are given. In some cases negative results are recorded in other conditions. In some cases positive reactions may occur. The results are likely to be of great value in the diagnosis of trichinosis in swine.

The fixation reaction may be successful in the diagnosis of trichinosis in man or swine. The incidence of trichinosis in man or swine is not high.

An antigen of *T. spiralis* was prepared and injected into rabbits. Frequent infection by larvae was observed.

The nematode discussed is *Trichinella spiralis*.

MALARIA

CHWEITZ J. Sur la limite altimétrique du paludisme en Afrique centrale et ses causes. [The Limit of Altitude for Malaria in Central Africa and its Causes.] *Acta Biol Belgica* 1942, 2, No 1, 92-5.

The limit of altitude for endemic malaria in Central Africa, as stated by the author, appears to be about 1700 metres. The absence of malaria above this height is due to the absence of the common Central African anophelines known to transmit the disease, namely *A. gambiae*, *A. funestus*, *A. marshallsi*, and others.

Nevertheless, other rare species which are restricted to high altitudes were found at 1900 and even 2100 metres. The least uncommon of these were *A. christyi* and *A. kingi*.

[GARNHAM in this Bulletin 1945, 42, 959 reported a severe epidemic of malaria in Londiani, Kenya in 1941 at an altitude of 7500-7800 feet and

another in 1944 to the north of this area at 8,300-8,500 feet: he also takes into account the mean atmosphere temperature in relation to the limits of anopheline breeding.]

- i. VAN THIEL, P. H. & WEURMAN, C. L'attraction exercée sur *Anopheles maculipennis atroparvus* par l'acide carbonique dans l'appareil de choix II. [Attraction of Carbon Dioxide for *Anopheles maculipennis atroparvus* in Apparatus II.] *Acta Tropica*. Basle. 1947, v. 4, No. 1, 1-9.

* ii. —. Attraction exercée sur *Anopheles maculipennis atroparvus* par l'acide carbonique dans un olfactomètre. [Attraction of Carbon Dioxide for *Anopheles maculipennis atroparvus* in an Olfactometer.] *Ibid.* 10-20, 2 figs.

i. In a previous paper [this *Bulletin*, 1939, v. 36, 1004] the senior author and his colleagues described experiments with a special apparatus in which the feeding preferences of races of *A. maculipennis* were studied. In the present paper, further experiments were carried out with *A. m. atroparvus* and the authors claim that carbon dioxide, especially if the concentration is 10 to 26 times that of the atmosphere, exercises an attraction on this species, in combination with blood, warmth and moisture, or combinations of some of these factors. Increase of temperature and humidity did not alone exercise the necessary attraction, and the authors therefore assume that the carbon dioxide itself must be regarded as the factor of attraction. The combined attraction of warmth, defibrinated blood and CO₂ does not, however, reach that degree produced, in other experiments, by the pig.

ii. The use of a modified olfactometer enabled the author to confirm the hypotheses based on experiments with the apparatus previously described; it was demonstrated that *A. m. atroparvus* was attracted by CO₂ up to a concentration of 10 per cent.

BURGESS, R. W. Pigmentation as a Specific Character in certain Anopheline Pupae, *J. National Malaria Soc.* 1946, Sept., v. 5, No. 3, 189-91, 2 figs.

The author reports that over a period of three years, separation of species of *Anopheles* by pupal colouration has been helpful, so far as laboratory-reared specimens are concerned. He suggests it may be possible to use the method in the field and particularly for separating members of the *A. maculipennis* complex. He briefly notes the character as seen in *A. quadrimaculatus*, *A. maculipennis* freeborn, *A. m. occidentalis*, and *A. punctipennis*. Pupae of *A. crucians crucians*, *A. c. georgianus* and *A. walkeri* are without distinctive markings and must be identified by other characters, unless only one of them is being compared with one of the pigmented species.

H. J. O'D. Burke-Gaffney.
H. S. Leeson.

WHITE, R. Senior. On the Outdoor Resting of some Species of Oriental *Anopheles*. *J. Malaria Inst. of India*. 1946, Dec., v. 6, No. 4, 425-8. [10 refs.]

"1. In three hill districts of East Central India outdoor resting of *Anopheles* is demonstrable in considerable numbers.
"2. Examination of the abdomens of these catches indicates that a dangerously high proportion of the *culicifacies* and the *fluvialis* group are out of doors at a period in the gonotrophic cycle when they are generally accepted as properly being at their feeding site and so susceptible to spray-killing with pyrethrum insecticide.

3 The anthropophilic indices of certain species as found at various catching sites are set out and the possible import of the differences found discussed

McARTHUR J The Transmission of Malaria in Borneo *Trans Roy Soc Trop Med & Hyg* 1947 May v 40 No 5 337 58 1 fig

Step by step the author tells the story of his two years search for an explanation of the peculiar malaria situation in British Borneo [see also this *Bulletin* 1946 v 43 1000] After much careful and persistent work he was able to prove that *Anopheles leucosphyrus* was the vector and not *A. maculatus* as had previously been supposed

He found *A. maculatus* breeding in close proximity to healthy areas while in highly malarious areas *A. maculatus* was not infected An experimental area of a square mile was therefore selected and monthly larval surveys were carried out for twenty four months During this time 44 000 larvae were they were present in *A. maculatus* 14 *A.* the following species were rare *A. leucosphyrus* *A. tessellatus* *A. aithens* *A. aithens bengalensis* *A. aithens palmatus* and a new variety of *A. aithens*

Meanwhile children were being examined and spleen rates recorded An

leucosphyrus The common plain breeders were *A. barbirostris* *A. kochi* and *A. philippinensis* Two villages in a ravine were specially studied one had a spleen rate of 100 per cent and the other a spleen rate of 25 per cent The village with the lower spleen rate was surrounded by *A. maculatus* breeding places some of them up to the doors of the houses

dissection Experiments with animal baits showed that mosquitoes arrived to feed at sundown and disappeared soon after However when the results of the catches from human and animal baits were compared it was found that ven of the species including *A. maculatus* preferred animals to man and that

including 4 *maculatus* contained animal blood

Thus *A. leucosphyrus* came to be suspected as the vector of malaria All possible methods of collecting adults and larvae were then employed and payments were offered for specimens of this species The collectors began to bring in as many as ten to fifteen *A. leucosphyrus* in a morning taken from defective bed nets and the first infected female was found After 761 dissections had been made the total of *A. leucosphyrus* found infected was 25 (3.3 per cent) the other 1954 dissections of eight other species including *A. maculatus* were all negative

Efforts were then specially directed towards locating the breeding places of

dense jungle shade, never anywhere else ; though other places were breeding other species in plenty.

Adults were found to come into houses on certain nights and not on others ; they always came in after midnight, had a feed and departed. Females were found infected in several parts of the island and consequently the author suggests that more dissections are necessary in other parts of the species' distribution.

Finally, there remained the question of control. Several methods were tested and after some failures with paris green and different means of jungle clearing, the method which promised greatest success was being tried out when the Japanese invasion put a stop to the work. The method of choice seemed to be a partial clearing of jungle for a short distance around breeding places (30 feet had been tried) to let in the light and the admission of cattle to the clearings to keep down re-growth ; this was done by the creation of grassy lanes following the stream-beds. As a demonstration of actual malaria control the method failed, because it could not be completed, owing to the invasion, but it did succeed in demonstrating an effective method of control of *Anopheles leucosphyrus* which had every prospect of being permanent. It had the advantage too, of being simple, understood by the people and in keeping with their way of life.

[Malariologists and medical entomologists would learn a great deal by reading this fascinating story in the original.] H. S. Leeson.

i. COUTINHO, J. O. Distribuição geográfica dos anofelinos do Estado do Rio de Janeiro. [Geographical Distribution of the Anophelines in the State of Rio de Janeiro.] *Arquivos de Hig. e Saúde Pública*. São Paulo. 1946, Sept., v. 11, No. 29, 439-57, 1 map. English summary.

ii. —. Anofelinos do Estado de Espírito Santo. Distribuição geográfica das espécies encontradas. [Anophelines of the State of Espírito Santo.] *Ibid.* 461-72, 1 map. English summary.

i. In the first paper the species of anopheline mosquitoes are listed for twenty-one of the fifty-two municipal areas comprising the State of Rio de Janeiro. *Anopheles darlingi*, *A. tarsimaculatus* and *A. albitarsis* are recorded as natural vectors of malaria and fifteen other species have been identified.

ii. The second paper lists the species of *Anopheles* for nineteen of the thirty-three municipal areas of the State of Espírito Santo. Eighteen species were identified, of which those named above are the natural vectors of malaria.

H. S. Leeson.

GERDJIKOFF, I. Ueber die Blutbeschaffenheit bei Malaria unter Vitamin C-Belastung. [The Constitution of the Blood in Malaria in relation to Vitamin C Concentration.] *Klin Woch.* 1939, Sept. 9, v. 18, No. 36,,1214-17, 7 charts.

SWYNGEDAUF, J., LE BOURDELLÈS, B. & MASSE, L. Le diagramme électrophorétique du sérum des paludéens. [Electrophoretic Changes in the Serum in Malaria.] *C. R. Soc. Biol.* 1947, Mar., v. 141, Nos. 5/6, 290-91. [10 refs.]

LEVICK, C. B. & MACGREGOR, M. E. Primary Malaria in London Children. Report of Two Cases. *Brit. Med. J.* 1947, May 31, 764-5.

The first of these cases was in a child of 6, who developed a febrile illness, the child was well between the attacks. negative blood films, when the spleen the fever ceased at once. Quinine was

[September, 1947]

continued for ten days, but some days after it was stopped, another rigor occurred and many benign tertian rings were found in a thin blood film. Treatment was on orthodox lines, progress was uneventful, and the patient remained symptom free, until 7 months after the original attack, when a relapse occurred, which was treated with apparently complete recovery. The child's father was a Cypriot, but he had been in England for 15 years. The patient had no contact with any relative from overseas. She had lived in Worcestershire and later in Welling Kent until two months before the malarial attack. During the war there had been a large American military camp near her home.

The second patient was a boy of 2, admitted to hospital with a 3 weeks' history of daily shivering attacks. His spleen was palpable and many benign tertian ring forms were seen in a thin blood film on the day after admission. There was a well-marked anaemia (3 million r b c 42 per cent haemoglobin). The child responded well to quinine and was discharged in a month. Neither of his parents had been abroad and there was no history of contact with a malarial case apart from a grandfather who had had malaria in 1918, without further relapse. The child had lived in London since he was 2 weeks old, except for brief visits to Bristol and the Isle of Sheppey. In the last name, a few weeks before the child's symptoms began.

It is pointed out that it is most unlikely that either infection was acquired, the whole family had been severely bitten by mosquitoes in August 1946, a few weeks before the child's symptoms began. It is pointed out that in London, where the density of population would have led to the recognition of more than one or two cases of infected mosquitoes had been present, primary case of malaria contracted in London has been recorded for over years.

It is suggested that the children were infected in Welling and the Isle of Sheppey respectively, despite the wide distribution of *A. maculipennis* in indigenous malaria in Britain has been confined almost entirely to the East seaboard and the Thames Valley. In 1919 300 cases were no there were 7 in 1945 and five cases are known to have occurred in 1946 [see this Bulletin, 1947 v 44 169 278].

H J O D Burke Gaffney

NAPIER, L. E. Primary Malaria in London Children. [Correspondence] *Brit Med J* 1947 June 21 900

In this letter, Dr Napier refers to the paper by LEVICK and MACGREGOR [above]. He expresses surprise that no statement was made excluding the commonest form of primary malaria in persons in non malarious areas, namely inoculation malaria produced by transfusion from a latent case or from an infected syringe. He suggests that as one of the cases reported showed more than one relapse it was unlikely to have been trophozoite-induced. Negative statements would have been of value. H J O D Burke Gaffney.

PULLEN, W. Spontaneous Rupture of the Spleen in Malaria. *Med J Australia*. 1947, Feb 22 v 1 No 8 241-3 2 figs

A warrant officer aged 31 had been stationed in New Guinea for nine months in 1945. He had never been in hospital with malaria. In October 1945, he returned to Australia and was discharged from the Army in the following month, after 53 months' service. He continued taking 0.1 gm of suppressive mepacrine daily until January 1946. Late in February he had "attacks

Malaria.

malaria "every few weeks and treated himself with four or five 0.1 gm. tablets of mepacrine at irregular intervals. This continued until July 15th, 1946: he never felt well during all this time.

In the second week of July, he vomited several times and had vague upper abdominal pain. Before starting work on the morning of 15th he had a sudden severe pain which seemed to "shoot from his right groin to his left shoulder," and he collapsed. The pain later became localized, chiefly in the upper abdomen and left shoulder.

He was admitted to hospital, where benign tertian malaria parasites were found in a routine blood film: the haemoglobin percentage was 63 (Haldane). The patient showed all the features of an acute abdomen: a diagnosis of ruptured malarial spleen was considered but discarded because of the complete absence of any history of trauma, a provisional diagnosis was made of ruptured peptic ulcer, complicated by malaria. An intravenous injection of 10 grains of quinine biphosphoride was given, and abdominal section performed.

At operation, much fluid blood was seen in the peritoneal cavity: the spleen was about twice its normal size, its capsule was split, and had been stripped from the diaphragmatic surface.

Attempts to mobilize the spleen resulted in free haemorrhage: when this was controlled, the spleen was removed, and the splenic bed drained. The patient's pulse was barely palpable, but throughout the operation he was given a continuous stream of serum, followed by blood; after the operation, further blood was given by drip transfusion. All these steps restored the patient's condition from its very low ebb. The same night, a rigor occurred, which was treated with intravenous quinine and with alkalis. In 36 hours, his haemoglobin was 52 per cent. (Haldane) and on the 21st day, when the patient was allowed up, it was 84 per cent. The patient made a good recovery, and was fully treated for his malaria throughout.

The spleen weighed 18 ounces and measured $15 \times 10 \times 7$ cm. Pigment was abundant, but no parasites could be found in stained sections. The spleen is illustrated in two photographs.

In discussing this case, the author points out that whilst malaria in the demobilized ex-Servicemen without medical supervision is likely to be followed by the appearance of malaria in masked and puzzling forms in civilian communities; and doctors should be alert in looking for such complications, particularly in benign tertian malaria, which is apt to be treated lightly, especially by the patient.

The literature of spontaneous rupture of the spleen is discussed, and this includes some Australian cases (but not the recent fatal one described in the *Mcd. J. Australia* by TORONE (this *Bulletin*, 1947, v. 44, 278)). Attention is drawn to the fact that such rupture may occur without pronounced abdominal rigidity and in the complete absence of any history of injury. The rapid deterioration in the patient's condition after the peritoneum was opened is also noted.

The author discusses the principle of massive fluid replacement in the seriously injured: in this case, the patient received no less than 4 litres of serum in about 70 minutes, with apparently satisfactory results: it is calculated that his haemoglobin value must have fallen to at least 26 per cent. (Haldane) before an infusion of blood itself became available. This emphasizes that such a patient may survive with a low haemoglobin value, in an emergency of this kind, if the circulating blood-volume is maintained.

The case mortality-rate in rupture of the spleen is discussed, and the seriousness of the condition stressed.

H. J. O'D. Burke-Gaffney.

HALAWANI A, BAZ I I & MORCOS F. The Antimalarial Chloroquine-Diphosphate (Aralen). *J Roy Egyptian Med Ass* 1947 Mar 30 No 3 128-36

Chloroquine (5 α 7618) was first synthesized in the United States and its suppressive and curative properties have already been described [this Bulletin 1946 v 43 708]. Under the name of Aralen (Chloroquine-diphosphate) the present preparation has been investigated by the authors in Egypt.

Forty-two patients were each given an initial dose of 4 tablets each containing 0.25 gm followed by 2 tablets (0.5 gm) at 8 p.m. at noon next day and at noon on the following day. Thus 2.5 gm were given in 48 hours. All the cases were controlled by examinations of thick blood films.

subtertian. Results were followed by examinations of thick blood films. Aralen was found to be active against asexual forms of both types of parasite and against sexual forms of *P. vivax* in one of two *P. falciparum* infections in which crescents were present. They persisted for six months.

Patients were rendered afebrile in one to three days except in two cases in which this result was delayed. Parasites also disappeared in one to three days. The drug was more rapid in action than quinacrine and CAM AQI [see this Bulletin 1947 v 44 698].

Toxic symptoms experienced were vomiting and epistaxis (1 case) headache (4) rigors (1). These were rare of occurrence and brief duration and left no ill effects. They were not apparently related to dosage or to the age and weight of the patient.

H J O D Burke-Gaffney

QUEVAVILLER A. Un nouveau sel de quinine le cinchothénate [A New Salt of Quinine the Cinchothénate]. *Reu Paludisme et Mâ Trop* 1947 May 15 v 5 No 36 97-101 1 fig [10 refs]

SMITH P K. Toxic Reactions following Administration of Atabrine Dihydrochloride. *J National Malaria Soc* 1947 Mar 6 No 1 37-40 2 figs

Much of the material described in this paper has already been considered in numerous abstracts in this Bulletin.

The main interest in the present contribution which was concerned with the question of flying efficiency amongst members of the U.S. Air Force lies in the observation that the incidence of gastro-intestinal activity was high after certain doses of mepacrine hydrochloride. The highest toxicity associated with suppressive doses was encountered when 0.2 gm or more as a single dose was given twice a week on non-consecutive days. Few toxic reactions were found with daily doses of 0.1 gm [see FRYDLAY above].

H J O D Burke-Gaffney

BUTLER M G. Atypical Lichen Planus Tropicalis. *Arch. Dermat & Syph* 1947 Apr 55 No 4 533-44 4 figs

This is a further comprehensive contribution to the study of atypical lichen planus which has been the subject of several abstracts in this Bulletin [see FRYDLAY above and 1947 v 44 499 for further references].

The present author's investigations were based on a study of 247 patients from the Pacific theatre and seen between October 1944 and September 1945. The number of cases and the details of them presented are unusually large. There were two deaths in a white man and woman respectively and these cases are described in very great detail. One in every twelve patients was a woman but members of several races were affected.

Despite the history of mepacrine therapy, the author is not convinced that the drug is the true cause of the eruption, although it may have contributed to it: he prefers the explanation that it is caused by some unknown infectious agent limited geographically to New Guinea and surrounding areas.

In a footnote, he adds, however, that since his paper was presented, the summation of opinions describing the disease include evidence of its occurrence in other geographic areas, which increases the probability of mepacrine being considered an aetiological agent.

[The last view will be found in the many references quoted above: nevertheless, despite the appearance of later material than that now presented by the author, his full and interesting study is a valuable contribution to the clinical knowledge of this condition.]

BAMI, H. L., IYER, B. H. & GUHA, P. C. Studies in Antimalarials. Part III. Preparation of Paludrine. *J. Indian Inst. Sci.* 1946, v. 29A, Pt. I, 1-8.

SPIKES, A. Studies on Synthetic Antimalarial Drugs. XVIII. The Absorption, Distribution and Excretion of Paludrine in Experimental Animals. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 30-38, 4 diagrams. [15 refs.]

In making the determinations indicated in the title, Paludrine was estimated by the hydrolytic method of the author previously described [this *Bulletin*, 1946, v. 43, 400; 1947, v. 44, 35]. The dosage administered to rats was 80 mgm. base per kilo by stomach tube and 20 mgm. per kilo when given intravenously. From the concentrations determined in various tissues, it was apparent that the drug was rapidly absorbed. The blood and plasma levels were low and the drug is not retained in tissues to the same extent as mepacrine. After oral dosage, about 5 and 12 per cent. of administered drug was excreted in urine and faeces respectively, but after intravenous dosage the respective figures were 33 and 2 per cent. In the latter case, excretion was mainly into the small intestine, partly in bile, and a much smaller amount appeared in the large intestine. The low recoveries suggest that Paludrine is largely metabolized in the rat. The results obtained in mice were comparable with those in rats. Only small amounts of drug were present in brain and indicate that the blood-brain barrier was not passed. By detailed estimations in the rabbit, it was shown that Paludrine was distributed in a similar way to mepacrine in the tissues but the former attains a much lower concentration in white cells of the blood. The urine was the main channel of excretion and the small recoveries in it and in faeces again indicated that the drug had been to a large extent metabolized by the rabbit also.

J. D. Fulton.

BRODIE, B. B.; UDENFRIEND, S.; BAER, J. E., DILL, J. D. & DOWNING, G.; CHENKIN, T.; TAGGART, J. V.; JOSEPHSON, E. S. W. The Estimation of Basic Organic Compounds in Biological Material. I. General Principles [BRODIE, UDENFRIEND & BAER]. *J. Biol. Chem.* 1947, Apr., v. 168, No. 1, 299-309. II. Estimation of Fluorescent Compounds [BRODIE, UDENFRIEND, DILL & DOWNING]. *Ibid.* 311-18. III. Estimation by Conversion to Fluorescent Compounds [BRODIE, UDENFRIEND, DILL & CHENKIN]. *Ibid.* 319-25. IV. Estimation by Coupling with Diazonium Salts [BRODIE, UDENFRIEND & TAGGART]. *Ibid.* 327-34. V. Estimation by Salt Formation with Methyl Orange [BRODIE, UDENFRIEND & DILL]. *Ibid.* 335-9. VI. Estimation by Ultraviolet Spectrophotometry [JOSEPHSON, UDENFRIEND & BRODIE]. *Ibid.*, 341-4. In this series of papers a number of simple methods are described for the estimation of organic bases in biological materials. Extraction of the free

bases from tissues is first carried out with the aid of selected solvents, in order to aid separation from metabolic products. Concentration of the extract is then effected in an aqueous medium and determinations of the amount of base present are finally made by fluorimetric or photometric procedures. These methods were elaborated during the late war, in evaluating large numbers of new chemotherapeutic agents for which a knowledge of the tissue distribution of the drugs was essential. Since minute quantities of a substance in less than 1 gamma—may have to be estimated, great care is required in avoiding absorption by glass surfaces and in the case of non polar solvents, the addition of ethanol proved of value. To test the specificity of the methods employed a comparison of the solubility of the original compound and that of the substance obtained by extraction is made so that the latter procedure may be modified as required. The fluorimetric method of estimation was found to be the simplest and most sensitive of all, once the best conditions of irradiation temperature pH of the medium the use of filters etc., had been determined. All of these factors can be largely controlled in solution it may sometimes be possible to confer this property by suitable treatment. Coupling of the base with a diazonium salt to give an azo dye is another useful method of estimation which is not readily interfered with by substances extracted from tissues. A further method depends on the fact that most salts of organic orange are relatively insoluble in water but much more soluble in organic solvents. The methyl orange extracted is measured photometrically after transfer to a small volume of acid and the amount of combined base can readily be calculated. This method has proved of particular value in the estimation of cinchonine. Ultra violet spectrophotometry is the method usually described. Details of all these methods which can generally be used for particular substances. Their successful employment, in the forms described above or after adaptation has been reported by a number of authors.

J D Fullon

WHITE R SENIOR & RAO V V On the relative Efficiency of Hand and Spray Catching of Mosquitoes. *J Malaria Inst of India* 1946 Dec, 1, 6
No 4 411-16

In studies of the behaviour of *Anopheles* in East Africa HADDON (the Bulletin 1942, 39 595) employed the method of hand catching. RIBBANDS (ibid 1946, 43 621) criticized this method as failing to capture about 7 per cent of the actual mosquito population and in his own investigation preferred to spray with pyrethrum and to make his counts on mosquitoes killed.

The present authors have not found any reports of comparison of efficacy between the two methods in relation to Indian mosquitoes and they therefore record the results of searches made at staff quarters along the Bengal Nagpur railway, by junior inspectors. These consisted of hand catches followed by spraying and counting the mosquitoes captured as a result of each process. The data relate to 26 865 anophelines of 17 species caught in houses and the results confirm Ribbands's contention remarkably closely. In cowsheds the proportion caught by hand was much smaller. The results do not permit any deduction on certain other comments made by Ribbands for checking treatments only. The authors conclude that if captures are required for species and sex data with DDT, hand-catching and a search of the floor for dead specimens should be recorded separately and pyrethrum should not be used. Full tables of results are given.

Charles W Sloocks

THOMSON, R. C. Muirhead. Recent Knowledge about Malaria Vectors in West Africa and their Control. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, May; v. 40, No. 5, 511-27. [28 refs.] Discussion 527-36 [Buxton, P. A.; Ribbands, C. R.; Scharff, J. W.; Williamson, K. B.; Walton, G. A.; Hindle, E.; McArthur, J.; Tredre, R. F.; Wenyon, C. M.; Thomson, R. C. M. (in reply)].

Malaria Transmission by Anopheles melas and A. gambiae.—By means of the egg characters and palpal banding described by Muirhead Thomson, it has been possible to differentiate *Anopheles melas* and *A. gambiae*, and thereafter to determine the sporozoite rate of the former. One thousand dissections by the No. 5 Malaria Field Laboratory revealed a 4.2 per cent. sporozoite rate. In the Lagos area, the author was able to arrive at comparative figures of sporozoite rate in *melas* and *gambiae*, exposed to chances of infection as equal as it is possible to find in nature; he concluded that *gambiae* with a mean sporozoite rate of 11.1 per cent. is nearly three times as effective a vector as *melas* with a mean rate of 4.5 per cent. During these investigations, the highest figures for any month were 8 per cent. for *melas* compared with the remarkable figure of 29 per cent. for *gambiae*. The author, therefore, concludes that *gambiae* and *melas* together form a very formidable partnership on the West African Coast.

Breeding Places of Anopheles melas.—The author describes briefly the characteristic breeding places of *Anopheles melas* in the "orchards" of *Avicennia* mangrove of the Freetown estuary. [A full description of this type of mangrove appears in papers of Muirhead Thomson and Tredre see this *Bulletin*, 1946, v. 43, 93, 1947, v. 44, 488.]

In distinction to conditions in Freetown estuary is the low-lying lagoon area of Lagos; there, the *Avicennia* mangrove is no longer a guiding light to the breeding areas of *melas*. The inter-tidal zone is characterized by great stretches of *Paspalum* grass, and *melas* is found breeding in a wide variety of places in this area. In the Gold Coast, *melas* breeds among the *Paspalum* grass at the edges of small lagoons in which there may be no clear mangrove belt. The author, in the course of his studies over a period of two years, found that even in places where *melas* is enormously abundant it makes use of fresh water only to a negligible extent, therefore, for all practical purposes, *melas* is rigidly confined to the area below high spring-tide mark.

Control of A. melas.—"Bundling" of the breeding-areas appears to be a most effective method for dealing with *melas* breeding, both in the Freetown estuary and around Lagos. At the latter place, Gilroy and his staff have carried out this work with thoroughness; it forms a perfect working model for all malarialogists who are likely to encounter this problem in any part of the world. [See this *Bulletin*, 1945, v. 42, 786.]

The author refers briefly to the differences in tidal conditions on different parts of the coast, which affect the siting and construction of the bund. He has formed the opinion that bunding may have great possibilities in the Bathurst area of the Gambia Colony. The best method of dealing with *melas* breeding on the Gold Coast has not yet been worked out.

Breeding Places and Control of Anopheles gambiae.—*Anopheles gambiae* remains probably the most dangerous anopheline in the world; in some ways, it proves a remarkably versatile adversary, while in others, it appears to be a narrow specialist with well-defined likes and dislikes, unable to maintain itself unless conditions are exactly suitable. The author refers to his observations on artificial flushing of stream beds in Sierra Leone, a control which had proved very effective against such stream-breeding mosquitoes as *A. minimus* and *A. fluctilis* in India; after most effective flushing, large numbers of

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full grown *gambiae* larvae and pupae were found in the stream bed an hour or so after subsidence of the flood. The sunlit pool or puddle usually described as the ideal breeding place for *A. gambiae* may be negative. This is exemplified on the laterite flats near Freetown where the proportion of apparently suitable pools for *gambiae* breeding is as low as one in 50 but in the occasional pool which seemed to satisfy all requirements whatever they may be hundreds of larvae and pupae may be taken in a few square feet of water surface.

The author in his investigations near Lagos was unable to bring about a substantial reduction either in the number of anopheles or in their infectivity by the regular house spraying with pyrethrum in kerosene as advocated by EDDEY on the Gold Coast [this *Bulletin* 1945 v 42 253]. Undoubtedly successes by spray killing were obtained against *gambiae* in South Africa and against *culisacres* in India.

DDT in Malaria Control—The author refers to the use of DDT as a residual insecticide in houses and to the commonly accepted idea that treatment of the inner walls and ceilings in houses will make them lethal to mosquitoes for two months or possibly longer. In Lagos he found that although many *gambiae* and *melas* remain in dark houses after feeding at night others leave the house at dawn and rest outside. He was able to show that, while a house treated with DDT in kerosene remains free of resting anopheles for weeks afterwards as early as the 4th day after treatment mosquitoes were entering the hut feeding on the occupants and leaving the hut after feeding. Of those escaping in this way there was no appreciable mortality in the following 48 hours. Within a week of treatment large numbers of mosquitoes were feeding in the hut every night all of them leaving afterwards so that nothing was found in the hut on the following day (Muirhead Thomson, 1947 in the press). Mosquitoes with gland infections were found resting outside the houses in an isolated village which had been thoroughly treated with DDT in kerosene.

The author concludes that in the Lagos area at least the dramatic fall in the house catch after treatment with DDT as a residual spray cannot be accepted as definite proof that mosquitoes are being killed.

Anopheline Reduction and Malaria Control—The author draws attention to the point that our measures to reduce anopheles are usually referred to as anti-malarial but in West Africa it is not clear at what point the two terms namely anopheles reduction and malaria control become synonymous everything depends on whose malaria we are trying to reduce that of the non-immune European or that of the indigenous African. He refers to the work of TURNER and WALTON in Freetown during the last 3 years [this *Bulletin*, 1947 v 44 640] where the reduction in anopheles density has been great enough to stimulate comparable investigation into the degree of reduction in malaria transmission to that end regular blood examination of infants from birth up to 18 months is in process so that exact data can be obtained regarding the frequency of new infections and their seasonal distribution. The extent to which malaria contributes to the ill health of adults in West Africa is not known and before rural malaria control is considered it would appear to be reasonable to find out first exactly how important rural malaria really is in that part of the world.

Discussion—In the subsequent Thompson's work DDT acted more as a irritant than as an insecticide the mosquitoes within the house were not dying but living and some were developing sporozoites which after all is the one thing we want them not to do. Perhaps there is a difference in the effect of DDT between the different species of anopheles and a further and fu

enquiry will have to be made. Dr. C. R. RIBBANDS thought that heavier applications of residual DDT would be more effective.

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Dr. B. WILLIAMSON reminded his listeners that Sir Ronald Ross is the final goal. He counselled investigations of the relations of soil and malaria by modern methods; certainly Malayan experience shows that the incidence of malaria is largely determined by soil characteristics. Not much interest has been taken in the subject today.

[In malaria surveys of the Gold Coast mines, it has been noted that *Anopheles gambiae* does not appear to breed in pools which are definitely acid and have a high iron content.

Dr. G. A. WALTON said it is not very easy to explain why *Anopheles gambiae* chooses to lay eggs in pools recently formed by workmen who have been getting rock out of the ground, and disregards entirely the multitude of adjacent permanent small pools. After quoting other examples, he said the general impression is that some form of human interference definitely excites the female *Anopheles gambiae* to the place where it will lay eggs.

In his reply, Muirhead THOMPSON expressed the opinion that the hole question of selection of breeding places is a very important one.

WHITE, R. Senior. *Anophellae Breeding in Ricefields*. *J. Malaria Inst. of India*, 1946, Dec., v. 6, No. 4, 437-68, 1 chart. [Numerous refs.]

R. Ford Trede.

The importance of rice-fields as breeding grounds for anopheline vectors of malaria has been the subject of special study, both in past literature and in the field where, with his co-workers, the author has accumulated much evidence which is fully tabulated in this paper. Their importance depends on the species of anopheline transmitting malaria in each locality, and the author concludes that :—

- when the vector is *Anopheles annularis*, all rice-fields are dangerous ;
- when the vector is *A. culicifacies* and the transmission period is during the south-west monsoon, fields are dangerous until the rice plant is 12 inches high ; fallow fields are extremely dangerous. After September, breeding diminishes whatever the stage of the rice ;
- when the vector is one or more of the *A. fluviatilis* group, all non-seepage rice fields are harmless. Seeping rice-fields and fallow are very dangerous so long as the fields are wet ;
- a great desideratum is a rice experimental station both in a hill area and in an *annularis* plains area, where in addition to strictly agricultural trials, methods of controlling vector-breeding could be studied.

COVELL, G. *Malaria and Irrigation in India*. *J. Malaria Inst. of India*, 1946, Dec., v. 6, No. 4, 403-10. [16 refs.]

G. Macdonald.

This note, prepared for a meeting of the Central Board of Irrigation, India, amounts to an indictment of the engineer as being responsible for a great deal of malaria by thoughtless construction of irrigation systems ill-adapted to local circumstances ; an example of what should be done by reference to the Tennessee Valley scheme ; and a plea for the inclusion of proposals for anti-malaria work in all engineering projects.

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Irrigation by lift by pipe by tides and from tanks may be harmful under special conditions. Inundation irrigation or the use of natural floods is often a source of danger but perennial canal irrigation is the most dangerous. The chief sources of danger in practice are in a general raising of subsoil water level in seepages and leakages from ill made channels and badly designed crossings as these avoidable by products. The actual canal or the cultivated field are rarely so important as these avoidable by products.

Illustrative examples include the Irwin Canal Project the Lower Chenab Canal and the Sukkur Barrage Scheme all of which had disastrous effects on the health of the population intended to benefit from them. The solution lies in co-operation between the engineer and the malarialogist a solution to which the author has contributed substantially by his constant teaching and by the courses of instruction on malaria for engineers which he has fostered.

G Macdonald

VISWANATHAN D K Experimental Rural Malaria Control Measures in North Kanara District, Bombay Presidency Part I J Malaria Inst of India 1946 Dec 16 No 4 77-82 16 refs
— & PARIKH R O Part II Preliminary Experiments with DDT Ibid 383-91

In these two papers the authors attempt to assess the relative value of different methods and combinations of methods of malaria control in the Kanara District of Bombay Presidency. This is a rural district where malaria is hyperendemic. The carrier is *Anopheles fluviatilis* which has an average infection rate of 10 per cent a high anthropophilic index and a considerable tendency to rest out of doors. It breeds in streams usually with vegetation and in rice fields.

The standards by which success or lack of it was measured were (a) the number of *A. fluviatilis* adults caught in 10 man hours (b) the spleen rate below which transmission was presumed not to occur (c) the spleen rate (d) the infant parasite rate and (e) dispensary returns. The author of the first paper tried the effect of clean weeding of rice fields alone this treatment combined with copper cyanide treatment of rice fields adult mosquito destruction with pyrethrum sprays and a combination of all these methods. Naturally combinations were more effective than single methods and the complete treatment was speedily effective but too expensive for routine application under rural conditions. The interest to the reader lies in the attempt to analyse the relative efficacy of each method. Although the author gives his own assessment roundly condemning spray killing as either ineffective or if effective too expensive the reader is not enabled to arrive at his own conclusion. Data for each set of observations are presented in slightly different forms which makes comparison almost impossible.

The second paper describes the results of DDT residual anti-adult sprays applied at the rate of one quart of a 1 per cent solution in oil per 1 000 sq ft in the same area. Again data are presented in slightly different forms from which it can be seen that *A. fluviatilis* disappeared entirely from treated houses and decreased in animal sheds whilst in untreated villages they are present though without ever reaching the critical level of 4 per 10 man hours. Spleen and parasite rates were lower in treated than in untreated villages (5 R 44 and 55 P R 16 and 21) and there was a significant difference in the infant parasite rate in the two series (2 out of 61 or 3.3 per cent in the treated series and 10 out of 31 or 32.3 per cent in the others).

The cost of the DDT work per head per year was rupee 0 8-0 that of the combination of the three methods in the first paper Rs 0-5-0 that of pyrethrum

spray treatment unstated; that of clean weeding and copper cyanide treatment, Rs. 0-8-0; that of clean weeding only, Rs. 0-12-0. The authors conclude that DDT as a control measure is economically feasible, that the combination of the three methods is too expensive for most areas, and that spray killing alone is too expensive for practical use.

WHITE, R. Senior & GHOSH, A. R. House Spraying with DDT: Further Results. *J. Malaria Inst. of India*. 1946. Dec., v. 6, No. 4, 489-508.

The authors continued work previously started by Senior WHITE [this *Bulletin*, 1946, v. 43, 306] on the measurement of the efficacy of DDT residual spray as a malaria control measure. A 5 per cent. solution of DDT in oil was used, the dose being increased, during the experiment, from 1 quart per 1,000 sq. ft. to 1 quart per 600 sq. ft. Reapplications were, for the most part, made when the discovery of sporozoite-infected anophelines suggested that the efficacy of the previous application was decreasing.

The effects on the state of infectivity of anophelines, which are tabulated at length in the original, may be summarized briefly in the following way:—

	<i>A. culicifacies</i>		<i>A. fluviatilis</i>		Other anophelines	
	Dis- sected	Sporozoite rate	Dis- sected	Sporozoite rate	Dis- sected	Sporozoite rate
Control Village Treated Villages	3,041	0	2,032	Per cent.	539	0-19
	2,021	0	233	2-6 0-35	162	0

The reduction in vector density varied from 13-7:1 to 227:1. There was a greater decrease in *Anopheles fluviatilis* than in *A. culicifacies*, a fact which the authors relate to the normal resting-places of the former species on walls and other places liable to have been sprayed with DDT rather than on furniture and other places likely to escape treatment. There was some reduction in the spleen rates in treated villages; but as that in the control village also decreased, no deductions can be drawn from this.

There is fairly substantial evidence that the interval between successive applications of DDT may be lengthened, presumably owing to a "reactivation" or re-solution and fresh dispersal of the old deposit. The intervals between successive applications of solution and the finding of infected mosquitoes lengthened in three villages from (1) 75 to 164 days, (2) 57 to 93 days, and

Age of film (days)	Contact (hours)
1-2	1
3-4	2
5	3
6-11	4
13-31	5
31-103	6
110-117	7
120-145	8
152-173	9

(3) 73 to 173 days. The aging of films was tested in the laboratory and the period of contact with a film of DDT necessary to kill all test mosquitoes was found to increase regularly with the age of the film. With a few minor exceptions the time of contact needed is as given in above table. G. MacDonald

ATTEN T H G A Study of Winter DDT House-Spraying and its Concomitant Effect on Anophelines and Malaria in an Endemic Area } National Malaria Soc 1946 Sept 1 3 163-87 2 figs & 1 map

Advantage was taken of the presence of extensive flooded areas near the mouth of the Volturno river in Italy to make a full-scale trial of the efficacy of DDT as a residual insecticide. It was applied as a 5 per cent solution in kerosene and also as a 10 per cent powder mixed with pyrophyllite. The normal rate of application in 1944 was 60 mgm per square foot and resulted in effective control for at least 80 days after treatment.

After these preliminary trials in January 1945 all habitations in a flooded area of about 8 square miles were treated with DDT in kerosene at the rate of 63 mgm per square foot. A regular record was made of the number of adult and larval mosquitoes in the test area and in a comparable untreated area remote from it. Anopheline larvae were first seen in March and fresh adults appeared during April. There was a very great reduction in the number of adults in the treated areas and this continued into the winter season though no subsequent application of DDT was made. The average anopheline densities per square yard of wall surface (in bedrooms goat sheds pigsties and stables) in the treated and untreated areas were —

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.
Treated	0.06	0.02	0.00	0.001	0.003	0.05	0.13	0.04	1.06
Untreated	—	—	—	9.8	42.84	167.04	118.5	185.04	185.54

It was noted that adults occurred in relatively great numbers in the vicinity of any untreated shelter however small and that spraying of every shelter was necessary for success.

Treatment of the resting places for adult mosquitoes was accompanied by a great decrease in the numbers of larvae in the neighbouring swamps. The average larval densities per 10 dips in the two areas were —

	April	May	June	July	Aug	Sept
Treated	0.17	0.71	0.32	0.06	0.02	0.00
Untreated	4.00	18.60	11.60	1.00	4.00	—

Spleen and parasite surveys indicated that the reduction in mosquitoes was accompanied by a reduction in malaria. The splenic index which had been 43 per cent in 1944 dropped to 25 per cent in 1945 whilst the parasite index dropped from 21 to 1 per cent. In the control area malaria remained at its old level or actually increased.

(This work is of particular value in its demonstration of the effect of adult mosquito destruction on the limitation of breeding. The results are much more successful than those previously reported and may be compared with those

achieved by GAHAN and LINDQUIST [this *Bulletin*, 1946, v. 43, 99]. In considering the two sets of results, it should be remembered that artificial flooding of the Voltorno area produced unnatural conditions in that all possible resting-places which might have been alternatives to the treated homes were submerged.] G. Macdonald.

GORDON, I. The Occupational Hazard of DDT Spraying. *Brit. J. Indust. Med.* 1946, Oct., v. 3, No. 4, 245-9.

A team of 27 African workers engaged in mixing and applying solutions of DDT in kerosene, often virtually without precautions to prevent skin contaminations, was watched for signs of DDT poisoning throughout the period July to October 1945, though members had been exposed since May. There were no significant changes in weight, in haemoglobin or in blood calcium. [It appears to the reviewer that there may have been significant changes in the leucocyte counts. Of 23 men on whom repeated counts were made, 21 showed an increase, the average increase being of the order of 3,000 per cmm., and the average count of the whole group rose from 6,300 to 8,000. In the absence of further data, including controls, this proves nothing but it suggests the need for closer enquiry.] Patch tests were mainly negative, and the author concludes that DDT, whilst itself innocuous, enhances the vesicant effect of kerosene.

WATSON, R. B., KIKER, C. C. & HESS, A. D. A Review of Malaria Studies and Control in the Tennessee Valley in 1945. *J. National Malaria Soc.* 1946, Sept., v. 5, No. 3, 193-203.

At the beginning of 1945, the stage seemed to be set for an epidemic of malaria in the Tennessee Valley. Immunity was extremely low, the spring was warm and favoured early breeding, and water conditions were unusually suitable for the development of *Anopheles quadrimaculatus*. The non-appearance of the epidemic is attributed partly to the very small number of gametocyte carriers as a result of past control (only 20 out of 15,338 blood films were positive in 1943-4) and partly to continued control, though high mosquito densities did occur.

Control of breeding was on normal lines, that is, management of water level and control of marginal vegetation, supplemented by the use of farvicides, DDT residual spraying and mosquito proofing. Several interesting observations were made of the relationship of anopheline breeding to plants, the methods of removal of plant species proving obnoxious by favouring anopheline breeding. Records are also given of the use of thermal aerosols containing DDT as a larvicide, of their harmlessness to fish, and of the use of DDT as a residual insecticide.

RODHAIN, J. Sur un *Plasmodium* du gibbon *Hylobates leuciscus* Geoff. [*Acta Biol. Belgica*. 1941, v. 1, No. 1, 118-23, 1 fig.

In June 1939, the author discovered a *Plasmodium* in the blood of a gibbon, *H. leuciscus* [this presumably refers to *H. leuciscus*], which had come from Java. The parasites were scanty in the blood on 2nd June, more numerous on 7th, and then disappeared.

A very detailed description of the parasite is given and this is supplemented by 7 microphotographs: for the description of the trophozoites, growing forms, schizonts, nucleus and infected red cell, the original paper must be consulted. (617)

trains, having a peculiar pale brownish green colour, larger and more numerous grains were seen, and these retained much opacified tint, or rather their lack of deep colour. In dividing schizonts, they collected in the same distinctive colour.

He considers that the forms, but considers that the rket pigment, and is in a slightly guish it from the *Plasmodium*

MANWELL, R D. Failure of *Aedes aegypti* and *Culex pipiens* to transmit *Plasmodium* *vaughani*. *J Parasitology* 1947, Apr., v 33, No 2, 167-9.

KYKER, G C, McEWEN, Mildred M & CORNATZER, W E. The Formation of Antimalarial Agents by Ultra-violet Decomposition of Quinine. *Arch Biochemistry* 1947, Feb., v 12 No 2, 191-9 [15 refs]

In a previous communication [this Bulletin, 1946 v 43, 706] the authors

recently made similar studies on the

is were treated with ... 5th group of birds received no treatment each solution was estimated by turbidimetry solution which had been extracted

From the results ... antimalarial agent other than quinine was present in the solutions. J. D. Fulton.

GINGRICH, W., SCHOCH, Eugenia W., SCHWAB, Marjorie & SHEPHERD, Catherine C. Radical Cure of Avian Malaria (*Plasmodium cathemerium*) with SN 8557, a Naphthoquinone Derivative. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 147-52, 1 fig. [13 refs.]

In investigating the curative effect of a number of naphthoquinone derivatives in bird malaria, canaries infected with different strains of *P. cathemerium* have been used. Infection was brought about by intravenous inoculation of parasitized blood or through sporozoites, and the resulting infections varied considerably in the mortality caused. The drug SN 8557 and three others were tested by administration of oral doses of 75 mgm. per kilo, in olive oil, twice daily, for periods of 5, 10 or 15 days. Curative effect was investigated in relation to the strain of parasite used, the phase and method of infection, and nature of treatment, for which experimental details are given. In the tests with SN 8557, 61 of 110 canaries were cured, and the best results were obtained in the 15-day treatment. Acute infections in which the exoerythrocytic phase was absent were easiest to cure, and the duration of the latent infections modified the curative rate. Host immunity lasted less than 5 months after cure had been effected.

J. D. Fullon.

TRYPANOSOMIASIS.

BURTT, E. Incubation of Tsetse Pupae: the Temperature Range experienced by Pupae kept under Normal Laboratory Conditions at Tinde. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 50-51.

In a previous paper [this *Bulletin*, 1946, v. 43, 827], the author noted better transmissibility and higher infection rates with *G. morsitans* and *T. rhodesiense* when the pupae from which the flies emerged were incubated at 30°C. than at the normal temperature of Tinde laboratory.

These normal laboratory temperatures, and the methods and conditions used in recording them, are now described. A table indicates the maximum and median daily temperatures by months at Tinde laboratory during 1941 to 1945.

This table indicates that the mean daily maximum temperature reckoned in this way sometimes reached or slightly exceeded 30°C. in the period September to December: temperatures over 30°C. were infrequent during the remainder of the year. On the other hand, the median temperature at Tinde laboratory was always below 30°C., by values ranging from some 2°C. during the hottest months to more than 8°C. in the coolest.

The incubation of pupae at approximately 30°C. was therefore not entirely outside the range of normal laboratory conditions, especially in the hot season: there was, however, the difference that while the pupae kept at laboratory temperatures were only exposed to them for a few hours at a time—and to much lower temperatures at night—the incubated pupae experienced the higher temperature continuously.

H. J. O'D. Burke-Gaffney.

THOMPSON, W. E. F. Nematodes in Tsetse. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 164.

Nematode worms of the *Mermis* type have been found in tsetse flies by a number of workers.

The present author records finding three specimens of these worms in the dissection of some 1,500 *Glossina morsitans*: the average length was 79 mm. Their chief interest lies in the fact that they seemed to be larger than those

Previously recorded and to occupy so much of the abdominal cavity of the tsetse as seriously to incommode it there was evidence that one fly had been forced to take two meals in an unusually short time and that it was still hungry when it was caught

H J O D Burke Gaffney

VANDERPLANK F L Experiments with DDT on various Species of Tsetse Flies in the Field and Laboratory Trans Roy Soc Trop Med & Hyg 1947 May \ 40 No 5 603-20

The experiments were undertaken to determine if DDT treatments to cattle or to attractive screens could exterminate tsetse fly in a given area. Laboratory tests in which flies were placed on treated hides for short periods were encouraging quite brief exposures (2 seconds) were lethal. DDT preparations leaving numerous small crystals had a longer persistent effect however. All species of *Glossina* tested were killed by DDT but some were more susceptible than others. Field trials were conducted with treated cattle and treated trap screens. Results were estimated by marking flies caught on treated and untreated surfaces and judging the lethality from subsequent recaptures. It was found that the lethal effect on cattle sprayed with an emulsion (to give about 10 gm DDT per animal) fell off in about six days. It was only apparently due to herbage brushing off the DDT crystals. It was reduced by using an emulsion containing an adhesive agent which gave persistence for about two weeks. Similar results were obtained with treated screens but the loss due to rubbing was less. Treated screens (2 m square with about 5 gm of 60 per cent pp DDT) were effective for about thirty days. The effect was somewhat reduced during humid or rainy weather.

J R Bustin

LAWS S G Trypanosome Counts in *Trypanosoma congolense* Infections Ann Trop Med & Parasit 1947 May \ 41 No 1 116-17 2 graphs

Many of the methods employed for estimating the number of trypanosomes present in the circulating blood are unsatisfactory in that they do not indicate the trypanosome content of a unit volume of blood the author refers to a number of methods based on the use of counting chambers standard dilutions of blood and the like see this Bulletin 1930 \ 27 237 but has had little success with any of them.

He did however obtain consistent results when comparisons were made with the number of leucocytes in a stained thick blood film and counts were made on duplicate slides.

Leucocyte counts of oxalated bovine blood taken from a vein were made by orthodox methods in a Neubauer chamber thick smears were made of blood from the collecting needle and these were stained with 0.1 per cent aqueous azur II for one or two seconds and then with azur II-eosin for 30 minutes. This technique stamps the trypanosomes well and preserves the morphology of the leucocytes. A stop was placed in the field of the eyepiece to facilitate counting and to avoid eyestrain.

The ratio of trypanosomes to a fixed number of leucocytes (500 or 1000) was found and the number per cmm calculated from this.

The blood was taken from two Ankole bovines infected with a pathogenic strain of *T. congolense* which had been maintained by 42 serial mouse passages. Trypanosome counts were made daily. The counts are shown in two graphs which indicate the peaks of *T. congolense* in the blood compared with the pyrexia in the animals.

The author suggests that this work should be repeated on a large scale, in view of the suggestion that there is a rhythmic developmental cycle in *T. congolense* and *T. vivax* infections, and that this may be related to the time at which treatment should be given. It is also hoped that this study may stimulate the production of an accurate, but less tedious technique.

H. J. O'D. Burke-Gaffney.

DAUZIER, Marguerite. Contribution à l'étude de l'immunité contemporaine d'un traitement chimique dans certaines trypanosomoses expérimentales. [Studies on the Immunity associated with Drug Treatment of certain Experimental Trypanosome Infections.] [Thesis for Doctorate in Pharmacy.] Université de Paris. Faculté de Pharmacie. Année scolaire 1944-1945. Série Etat, No. 9, 166 pp. [Bibliography.]

The greater part of this thesis covers well-worn ground, without adding much in the way of new phenomena or new interpretations. As is frequent in theses

some judicious condensation of these protocols before they were committed to the press. And since the work has been dignified by appearing in print, one would have welcomed more careful proof-reading. Rightly or wrongly, carelessness on the part of the author or publishers in this matter tends to make the reader unduly suspicious of the validity of the work as a whole, and thereby places the author's contribution at an unfair disadvantage. It is disturbing, for example, to find H. Lyndhurst DUKE appearing as LYNDHURST and DUKE, and G. M. FINDLAY as LINDSAY.

The opening chapter is a useful, though not exhaustive, survey of the literature on immunity in trypanosomiasis of man, cattle, and experimental animals. Practically all this material has been abstracted at various times in this *Bulletin* and its fore-runner, the *Sleeping Sickness Bulletin*.

The author's own investigations were conducted with old laboratory strains of *T. brucei*, *T. evansi*, and three varieties of *T. evansi*, viz. *T. maroccanum*, *T. med strain*.

rabbits were of such serum. Immunity was produced, throughout the work, by drug-treatment, the compounds used being Sulpharsphenamine, Tryparsamide, Suramin, Pentamidine, "Anthiomaline", and "Pentastib" (an aromatic pentavalent antimonial).

As has generally been found by others working on these lines, the immunity was always confined to the homologous strain. Its duration was irregular, especially a few phenomena

draws attention to the prolonged incubation periods which frequently characterize the infections produced in such immunized animals as are no longer refractory to reinoculation. [FULTON and LOURIE (this *Bulletin*, 1947, v. 44, 403) have recently associated the prolonged incubation periods in such cases with a change in antigenic type on the part of the trypanosome.]

Intravenous inoculations were found to produce infections in immunized mice more readily than intraperitoneal or intracerebral inoculations.

The author believes, on somewhat slender evidence, that the refractory state is to some extent conditioned by the drug used (though not by the size of dose), sulpharsphenamine being regarded as the most successful in producing immunity,

and she writes (p 160) that it is undeniable that trivalent or pentavalent arsenic plays a favourable rôle in the formation of antibodies whilst antimony which has a rapid (nette et rapide) action on the trypanosome, does not appear to favour the formation of antibodies. It is not easy to accept this generalization either on theoretical grounds or on the evidence presented.

Baby rats born of immune mothers were found to share the latter's immunity confined to the homologous strain for periods not exceeding 20 or 30 days that is during the suckling phase. Young rats could also be passively immunized by ingesting (or by being injected with) the serum of an immunized rabbit. Other sections of the thesis deal with the size of the spleen in relation to body weight (increased when the blood contained parasites but no greater in immune than in normal rats) the immunity reactions of splenectomized rats (found to be similar to those of unsplenectomized rats) and the refractory state exhibited by immunized conditions) and the rectal temperature of rats (found to bear no constant relation to the state of infection).

The author considers that the refractory state exhibited by immunized animals is attributable to a true immunity rather than to a premonition that the immunity is not dependent upon the continued presence of parasites within the host.

E M Lourie

MERCHANT D J Streptomycin in Treatment of Experimental Trypanosomiasis in White Mice and Chick Embryos *Proc Soc Exper Biol & Med* 1947 Apr v 64 No 4 391-3
This treatment was not successful

FRIEDHEIM E A H & VOGEL H J Trypanocidal and Spirothetocidal Compounds derived from BAL and Organic Arsenicals *Proc Soc Exper Biol & Med* 1947 Apr v 64 No 4 418-19
An account of preliminary observations

DUBOIS A Action du trichlorure d'arsenic sur l'infection expérimentale par *Trypanosoma congolense* [Action of Arsenic Trichloride on Experimental Infections by *T. congolense*] *Acta Biol Belgica* 1942 v 2 No 1 5-10
The action was definite and rapid in mice especially by the pulmonary route the mode of action is uncertain and is unfortunately related to an extreme toxicity

RODHAIN J Au sujet du développement intracellulaire de *Trypanosoma lewisi* chez *Ornithodoros moubata* [The Intracellular Development of *T. lewisi* in *Ornithodoros moubata*] *Acta Biol Belgica* 1942 v 2 No 4 413-15

AN DEN BRANDEN J F Réaction de fixation du complément chez des lapins normaux avec l'antigène à *Trypanosoma equiperdum* et avec l'antigène à *Trypanosoma evansi* [Complement Fixation in Normal Rabbits with *Trypanosoma equiperdum* and *Trypanosoma evansi* Antigens] *Acta Biol Belgica* 1942 v 2 No 1 26-9
The blood of normal rabbits did not fix complement in the presence of these antigens

RODHAIN J Sur la spécificité morphologique et biologique de *Trypanosoma pipistrelli* E Chatton et R Courrier [Morphological and Biological Specificity of *Trypanosoma pipistrelli* Chatton and Courrier] *Acta Biol Belgica* 1942 v 2 No 1 53-8 1 fig

RODHAIN, J. Au sujet du développement intracellulaire de *Trypanosoma pipistrelli* (Chatton et Courrier) chez *Ornithodorus moubata*. [The Intracellular Development of *T. pipistrelli* in *Ornithodorus moubata*.] *Acta Biol. Belgica*. 1942, v. 2, No. 4, 416-20.

RODHAIN, J. & BONE, G. Essais d'infection de la cavité générale de la tique *Ornithodorus moubata* par *Trypanosoma pipistrelli* et *T. vespertilionis*. [Attempts to Infect the General Cavity of *O. moubata* with *T. pipistrelli* and *T. vespertilionis*.] *Acta Biol. Belgica*. 1943, v. 3, Nos. 1/2, 5-8.

RODHAIN, J. & HENRY, E. Sur l'existence de *Trypanosoma vespertilionis* Battaglia et *Trypanosoma pipistrelli* Chatton et Courrier chez diverses espèces de Chauves-Souris en Belgique. [The presence of *Trypanosoma vespertilionis* Battaglia and *T. pipistrelli* Chatton and Courrier in different Species of Bats in Belgium.] *Acta Biol. Belgica*. 1942, v. 2, No. 2, 261-4.

RODHAIN, J. Notes sur *Trypanosoma minasense* Chagas. Identité spécifique du trypanosome du Saimiri: *Chrysomix sciureus*. [Notes on *Trypanosoma minasense*. Specific Identity of the Trypanosome of the Monkey *Chrysomix sciureus*.] *Acta Biol. Belgica*. 1941, v. 1, No. 1, 187-93, 2 figs.

HERNÁNDEZ-MORA, Cecilia. Infección natural del *Triatoma capitata* Usinger 1939 por el *Trypanosoma cruzi*. [Natural Infection of *Triatoma capitata* Usinger 1939 by *Trypanosoma cruzi*.] *Rev. Facul. de Med. Bogota*. 1947, Jan., v. 15, No. 7, 465-80, 4 figs [30 refs.]

LEISHMANIASIS.

SEN GUPTA, P. C. & CHAKRAVARTY, N. K. Observations on Agranulocytosis complicating Indian Kala-Azar. *Indian Med. Gaz.* 1947, Jan., v. 82, No. 1, 11-16, 3 charts.

A full account of three cases; the usual oral and pharyngeal lesions may be inconspicuous or absent.

SARROUY, C., CABANNES & ROCHE. Trois nouveaux cas de kala-azar du nourrisson et de l'enfant traités par le 2168 R.P. [Infantile Kala Azar treated with 2168 R.P.] *Algérie Méd.* 1947, Feb., No. 2, 155, 157-61, 163, 4 figs.

The senior author and his colleagues have already reported favourably on the use of this compound in a single case of infantile kala azar [this *Bulletin*, 1947, v. 44, 55. Six further cases were reported by DURAND *et al.*, *ibid.*, 56]. The present is a detailed account of the results in three other patients.

The cases were all diagnosed by finding L.D. bodies in the spleen. Some of the details may be tabulated as below:—

Age (years)	Weight (kgm)	Duration of symptoms (months)	Intramuscular daily for 10 days	Treatment	
				as gm 2168 R P	as gm Antimony
					2 465
	9	5	2 cc first dose then 3 cc x 9	8 67	2 2825
	6 6	3	2 cc first dose then 2 5 cc	7 35	3 2725
2	1		9	11 55	
	23 1	1	2 5 cc first dose then 4 cc x 9		1
3	8				

[* The figures are as given by the authors but they are clearly not exactly correct since the proportion 2168 R P antimony is not precisely the same in all three cases]

By about the 4th day of treatment in all the cases improvement was obvious the temperature having settled to normal the spleen already being smaller and L D bodies having disappeared Improvement continued rapidly body weight increasing and the blood picture returning to normal Observation periods were only 4 months 1 month and two weeks respectively

There were no serious toxic effects of treatment and the authors conclude that this compound is the most efficacious yet known

E V Lourie

JERACE Felice I flebotomi degli Abruzzi. Nota (Pilebotomus persilicus Parrot 1930 trasmettitore della leishmaniosi cutanea negli Abruzzi) [The species of *Pilebotomus* in Abruzzi] Ann d Igiene 1940 June v 50 No 6 284-8 2 figs 10 refs

The author records the presence of and describes *Pilebotomus persilicus* Parrot 1930 in the Abruzzi area it is the vector of cutaneous leishmaniasis along the coastal zone of central Italy

H J O D Burke-Gaffney

FEVERS OF THE TYPHUS GROUP

MORGAN H R STEVENS D A & SNYDER J C Effect of Streptomycin on Growth of *Rickettsiae* in Eggs Proc Soc Exper Biol & Med 1947, Mar v 64 No 3 342-5

Using a technique described in the paper the authors found that injections of 2 0 mgm of streptomycin administered into yolk sacs of embryo chicks two hours before inoculation with *Rickettsia prowazekii* had some inhibiting effect on

the growth of the organisms; with *R. mooseri* a lesser, but still significant, effect was produced, but with *R. orientalis* there was no significant effect. PABA (*para*-aminobenzoic acid) in doses of 5.5 mgm. caused a striking inhibition of the growth of *R. prowazeki*, and in doses of 11.0 mgm. had a similar effect on *R. mooseri* and *R. orientalis*. The authors consider it unlikely that streptomycin would have any striking effect on human infection caused by the above rickettsiae.

John W. D. Megaw.

CABASSO, V. Reaction of the Human Body Louse (*Pediculus humanus corporis*) to the Ingestion of Guinea Pig Blood. *Proc. Soc. Exper. Biol. & Med.* 1947, Apr., v. 64, No. 4, 437-9.

"Contrary to general belief, the experiments reported above indicate that guinea pig blood *per se* is not toxic to the human body louse.

"In the first experiment it was demonstrated that the red blood cells of guinea pigs remain undigested in the gut of the louse.

"In the second experiment it was shown that lice starved for an average period of 36 hours and then fed once on a guinea pig, die within 72 hours, apparently of starvation. Control lice fed only on human blood, likewise were found to die 4 to 4½ days following their last human blood meal.

"In the third experiment it was shown that lice fed once on guinea pig blood live their normal life span when their daily feedings are continued subsequently on human blood.

"It would appear that human body lice secrete a digestive enzyme specific only for human red blood cells which makes it impossible for them to digest guinea pig blood."

CABASSO, V. Mass Infection of Body Lice with *Rickettsia prowazeki*. *Proc. Soc. Exper. Biol. & Med.* 1947, Apr., v. 64, No. 4, 439-40.

"The experiments reported above indicate that human body lice fed once on a typhus-infected guinea pig at the height of the febrile period, and subsequently fed on a typhus-immune human, develop massive infection with *Rickettsia prowazeki*. In comparison to the rectal inoculation of lice for the preparation of the Weigl type typhus vaccine, this method of infecting lice seems to offer certain advantages."

PACKALÉN, T. Rickettsial Agglutination and Complement Fixation Studies in Epidemic Typhus Fever. *Acta. Path. et Microb. Scandinavica.* 1945, v. 22, No. 6, 573-92, 5 figs. [42 refs.]

The author gives a detailed analysis of the results obtained in a large series of serological tests carried out between January 1943 and January 1944, with the object of finding the comparative value of the rickettsia-agglutination (R.A.), complement-fixation (C.F.), and Wed-Felix (W.F.) reactions in the diagnosis of typhus fever.

The author's method of carrying out the R.A. test has already been described by HANMARSTRÖM [this *Bulletin*, 1947, v. 44, 194]. With this method, the diagnostic titre is said to be 1-20,000 or over: the corresponding titres of the C.F. and W.F. tests were 1-1,200 and 1-200 respectively. Curves showing the rise and fall of the titre in the three tests were in general agreement, except for the great differences in their height.

The C F test was regarded as preferable to the R.A. test because of the technical difficulty involved in carrying out the latter test by the author's method
John W. D. Megaw

BARLOVATZ A. Incubation prolongée de typhus congolais. Auto-observation [Prolonged Incubation Period in the Congo Form of Typhus. Personal Experience of the Author] *Ann Soc Belge de Méd Trop* 1946 Dec 31 v 26 No 4 323-7

On December 10th 1939 in Brussels Dr Barlovatz developed an irregular fever varying from 102° to 104°F and eventually falling by lysis on the 20th. On the sixth day a fine macular eruption was seen on the trunk and limbs and a diagnosis of typhus was suspected. There was no albuminuria, the features were in general those of the febrile state, there were no complications and convalescence was rapid after a comparatively mild attack. Blood was taken on December 21st for the Weil-Felix test and showed positive *Proteus* OX19 agglutinations up to 1/640.

The author adds that 9 days before his illness began he had visited Dr Giroud in his laboratory at the Pasteur Institute in Paris and that the latter informed him that he had been struck by Dr Barlovatz's *lettre de typhique* at the time he had seen him in North Africa rather than in Paris. He would have suspected typhus. The author adds however that the *n'est d'ailleurs qu'un détail*.

Clinically the disease resembled the Forest typhus of the Congo previously described by him [thus *Bulletin* 1940 v 37 565] and not the more severe European type. As there was no exanthematic typhus in France or Belgium during this time the author was perplexed at the origin of his disease which he considers in great detail.

It appears that in the summer of 1939 he had been in charge of a number of cases of typhus in Maniema in the Belgian Congo and had fed body lice on them in attempts to produce rickettsial infection in the latter. Conditions in the neighbourhood were favourable to infection and some of the hospital staff did in fact develop typhus.

The author left Maniema on September 2nd and returned to Europe via Tanganyika and thence by sea to France calling at Dar es Salaam, Suez and Port Said en route. There was no evidence of typhus nor of unhygienic conditions in any of these places. He arrived in Brussels on December 3rd. The incubation period is therefore claimed to have been at least 99 days.

He refers to the occurrence of Brill's disease in the United States among immigrants from countries where epidemic typhus is endemic years after the arrival. He also refers to the case recorded in Russia in 1918 and LOFFLER in this *Bulletin* 1946 v 43 543 in an Armenian who had been in that country for 7 years and who had had typhus in Russia in 1918.

The author concludes that his own infection must have been contracted in the Congo and that the incubation period was at least 3 months.

In an ensuing discussion BRUTSAERT referred to the author's statement that 9 days before his attack he had visited a laboratory where typhus research was in progress and suggested that a laboratory infection was possible. The author replied that his visit was a brief one of about an hour and a quarter and that he was not working there nor was he exposed to any infected material. Nevertheless this last hypothesis cannot be ignored or its possibility excluded completely. It is at least more consistent with the recognized incubation periods than the alternative proposition. Also in Mooser and L. case which the author quotes in comparison the lapse of time between infection and symptoms appears to be related to latency following a known

rather than to an initial incubation period following primary exposure to infection. The fact that the author's attack clinically resembled the milder Congo "Forest typhus" and not the "European typhus, which is generally more serious" is not, of itself, necessarily significant: any form of typhus may be mild.]

H. J. O'D. Burke-Gaffney.

JUDE, A. & BRUMPT, L. Deux cas de typhus exanthématique survenus après un choc thérapeutique. Discussion sur l'incubation prolongée et la cause déclenchante. [The Occurrence of Two Cases of Typhus Fever after Therapeutic Shock. Discussion of the Prolonged Incubation Period and the Exciting Cause.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 1/2, 3-8, 2 charts.

The authors briefly describe two cases of typhus fever which occurred in Algiers in early September 1940. Both of the patients were admitted to hospital on the same day; each of them had received an injection of anti-gonococcal vaccine which caused sharp febrile reactions lasting a few hours; the onset of the attack was 12 days in one case, and 10 days in the other, after the therapeutic shock.

The circumstances suggested to the authors that the vaccine may have lighted up latent infections, which probably had been present for considerable periods of time, because no recent source of infection could be detected. It is suggested that latent infections of this kind may play a part in the carry-over of infection from one epidemic to another. An analogy with the prolonged incubation period often observed in malaria is also suggested.

John W. D. Megaw.

SADUSK, J. F., Jr. Typhus Fever in the United States Army following Immunization. Incidence, Severity of the Disease, Modification of the Clinical Course and Serologic Diagnosis. *J. Amer. Med. Ass.* 1947, Apr. 19, v. 133, No. 16, 1193-9, 2 charts. [Refs. in footnotes.]

The author states that the excellent results obtained from the use of epidemic-typhus vaccine in the U.S.A. Army are most clearly shown by the fact that, during the period 1942-1945, no death occurred from epidemic typhus among the large number of troops exposed to risk of infection.

Altogether there were 64 cases of the disease, but this low incidence could not be attributed solely, or even chiefly, to immunization, because the troops were thoroughly protected against infection by MYL and DDT powders.

The vaccine used was an ether-treated yolk-sac suspension of the Breinl strain of *Rickettsia prowazeki*. Until the autumn of 1943, the initial vaccination consisted of three doses given subcutaneously at intervals of seven to ten days, and single refreshing doses were given every six months in endemic areas. Later, when improved vaccine became available, only two initial doses were given, and the refreshing doses were given at the beginning and middle of the typhus season.

There was no evidence that the vaccine conferred substantial immunity against murine typhus.

In the official reports of the U.S.A. forces all the louse-borne, flea-borne, and mite-borne typhus fevers are shown together under the heading "typhus fever", but the author assumes (1) that all the cases (603) contracted in the continental United States were murine, (2) that it is reasonable to suppose that the 6,685 cases reported from the south-west Pacific, and China-Burma-India areas, were scrub typhus; and (3) that the 64 cases reported from the European, Mediterranean, and Africa-Middle East areas were of the epidemic type.

[Although this assumption is obviously open to criticism, its adoption does not seriously invalidate the conclusion that the vaccine had a high degree of protective value]

The paper contains a useful summary of the literature of immunization against typhus fever by vaccines including 23 references to articles on the subject

John W D Megaw

WEITZEL U Fleckfieberbehandlung mit Rekonvaleszentenblut [The Treatment of Typhus with Convalescent Blood.] *Klin Woch* 1944 Aug/Sept, v 23, Nos 31/39 341-2

BENGTSON Ida A Classification of the Rickettsiae of Rocky Mountain Spotted Fever and of Endemic (Murine) Typhus. *J Bacteriology* 1947, Mar v 53 No 3 325-7 [15 refs]

The author describes herself as "retired" but it is to be hoped that this paper will not be the last of her valuable contributions to the literature of the typhus fevers

The present paper consists of an academic discussion of the nomenclature of the Rocky Mountain spotted fever and murine typhus

Dermacentroxenus rickettsii is more closely related to *Rickettsia* than *Dermacentroxenus* *rickettsii* is rickettsial the appropriate name would be

type, and will probably prefer to use the inherently inappropriate nomenclature regarded by John W D Megaw correct]

PINTO, M R Le typhus murin de l'embryon de poulet [Murine Typhus in Embryo Chicks.] *Archivos Inst Bact Câmara Pestana* 1945, v 9, No. 2, 228-42, 2 figs on 1 pl [26 refs]

In a study of *Rickettsia mooseri* the author employed embryo chicks for experiments usually carried out on mammals

It was found that infection could be transferred from embryo to embryo by the intra embryonic intravenous and intra-ammotic routes By the intra-embryonic route typical lesions of the disease were produced in the embryo, in which Weil Felix tests yielded positive results Immunity tests were also carried out The intra amniotic route gave less satisfactory results

The article is likely to be of interest only to expert workers on the rickettsiae.

John W. D Megaw

ZUIDEMA P J Scrubtyphus (Schmiek en behandeling) [A Clinical Account of Scrub Typhus.] *Med Maandblad Bavana* 1947, May, No 10, 183-6

Report of a case and discussion of the literature

- PETERSON, O. L. & FOX, J. P. The Antirickettsial Effect of Thionine Dyes.
I. The Use of Methylene Blue and Toluidine Blue to combat Experimental Tsutsugamushi Disease (Serub Typhus). *J. Exper. Med.* 1947, May 1, v. 85, No. 5, 543-58. [27 refs.]

The author carried out a series of experiments on the therapeutic action of various drugs on mice infected with the Karp strain of *Rickettsia orientalis*. The best results were obtained with medicinal methylene blue administered with the food; toluidine blue also proved effective. A high degree of protection resulted when the drugs were given from the time of inoculation, but substantial benefit was observed when the first doses were given after the onset of the illness.

Unfortunately the corresponding scale of dosage of methylene blue could not be tolerated by human beings when given by the mouth, and intravenous administration in adequate doses had been found by other workers to cause haemolytic anaemia.

The striking effect of methylene blue in mice suggested to the author that it might be possible to find a related compound in which the therapeutic element would be dissociated from the toxic element.

Among other lines of study a combination of methylene blue with para-amino-benzoic acid is being tested, and already encouraging results have been obtained.

The paper will be read with great interest by workers on the chemotherapy of rickettsial diseases.

John W. D. Megaw.

- BLANC G. & MARTIN L. A. Non transmission de la Q. fever (virus marocain) par la puce du rat (*Xenopsylla cheopis*). [Failure of the Rat-Flea to transmit a Morocco Strain of Q Fever.] *C. R. Soc. Biol.* 1947, Mar., v. 141, Nos. 5/6. 263-4.

YELLOW FEVER.

- LAVIER, G. Navigation aérienne et extension de la pathologie exotique. [Air Travel and the Spread of Tropical Disease.] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 15/16, 285-7.

A review on the lines of that of FINDLAY, this *Bulletin*, 1947, v. 44, 579.

- ANDERSON, C. R. & GAST-GALVIS, Augusta. Immunity to Yellow-Fever Five Years after Vaccination. *Amer. J. Hyg.* 1947, May, v. 45, No. 3, 302-4.

g the duration of
and, referring to
CABRAL and of
1943, v. 40, 451;
1946, v. 43, 34] they suggest that the reports are somewhat conflicting. The
first-quoted workers above found that such immunity lasted for 4 years; the
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in four Colombian towns in order to assess their immune status since their vaccination about 5 years previously. The towns concerned were Cisneros,

Caracoli La Palma and Honda in which no yellow fever had been reported for 20 years all the persons examined claimed to have resided in their areas all their lives some of them may possibly have been exposed to yellow fever in the forest

Sera from the persons selected were usually tested by intraperitoneal injection of mice but in a few cases where the amount of serum was small the intracerebral route was employed. Survival ratios of 1/6 (or higher values) with an average survival time of 7 days or more were considered evidence of the presence of antibody

A table shows the results obtained with the 623 sera tested. The percentage showing neutralizing antibodies 5 years after vaccination varied from 91 between the ages of 6 and 9 to 96 in those over the age of 30 the average percentage was 93. Twenty of 65 sera in children of the 6 to 9-year group were from those who were under 3 at the time of vaccination five years later the sera of 16 of them (80 per cent) contained antibodies. Of 45 sera from children who were between 3 and 4 years when vaccinated 43 (96 per cent) were positive. Because of the small groups the authors do not regard this difference as statistically significant and they conclude that the response of children under 3 does not differ materially from that of older persons.

The authors conclude that in view of the high proportion of persons of all ages having neutralizing antibodies 5 years after vaccination with the 17D strain of yellow fever virus revaccination is not required within that period.

H J O D Burke Gaffney

DENGUE AND ALLIED FEVERS

SABIN A B & BLUMBERG R W Human Infection with Rift Valley Fever Virus and Immunity Twelve Years after Single Attack *Proc Soc Exper Biol & Med* 1947 v 64 No 4 385-9 1 fig

At least 17 laboratory acquired infections with Rift Valley fever have been reported. The authors describe a case arising from the K strain of virus obtained from Japan where it had been incorrectly called dengue. The

and dengue) are non pathogenic to them when inoculated in this way.

The K strain of virus had undergone at least 300 intracerebral passages in mice before this infection was acquired. There was however no apparent modification in its pathogenicity possibly because the virus from the first readily multiplies in the mouse and requires no adaptation.

Neutralizing antibodies began to appear on the fourth day after onset and the high titre of 1/585 000 was reached on the tenth day. Antibodies persisted or 12 years after an attack in the case of another person who was examined.

P C C Garnham

MIYARA, S., CONTE, D., HORENSTEIN, B. & CÓRICA, P. La peste rural en la Provincia de Mendoza. Estudio clínico epidemiológico. [Rural Plague in Mendoza.] *Rev. Asoc. Med. Argentina*. 1947, Mar. 15-30, v. 61, Nos. 601/602, 161-82, 17 figs. (3 maps). [24 refs.]

Rural plague in Mendoza, a province of the Argentine Republic, has been sylvatic plague. The authors have collected the data of outbreaks of 1937, '39, '41, '43 and '44, recording a wealth of clinical and epidemiological detail for the several cases. Maps, charts, diagrams and photographs illustrate the article. The epidemic of 1937 differed from the four subsequent outbreaks, which were bubonic and septicaemic, in being pneumonic. The infection in all five years was initiated by sylvatic rodents. The first, 1937, was the most interesting and is illustrated by its nine cases. Two patients presented noteworthy features, one in whom the condition lasted for 11 days, and the other, unique for the Argentine, a recovery from pneumonic plague. As in so many plague outbreaks, recognition of the nature of the first case is not immediate and so it was in the 1937 epidemic. The first patient contracted plague by direct cutaneous infection when he skinned two local wild rodents (*cus*) that he had caught. This is apparently the usual mode of infection in relation to sylvatic plague, where the insect parasites of the rodents concerned play only a problematical rôle as vectors for man. In this respect they contrast with the rat flea of city and port plague. The infected person returned to his home in Mendoza, developed a septicaemic terminal bronchopneumonia and became the disseminator of what developed in due course into primary pneumonic plague. His case had been diagnosed as internal haemorrhage and typhoid, nor was the diagnosis established as plague until the fifth case had occurred. Transmission was interhuman, and buboes were absent. A table of 27 epidemics of pneumonic plague which occurred between 1913 and 1938 shows that 222 individuals died of the 223 involved and that one pneumonic patient survived in the 1937 outbreak.

animal population has fortunately not been equalled by anything similar in the human sphere, but the fear remains of communication of plague from the sylvatic rodents to the rats of cities and ports, with the certain production of epidemics of the rat-flea-man type.

Some of the conclusions to this long article are of interest: (1) Pneumonic plague, judging by the freedom from infection of doctors and nurses, requires for its production close proximity to the patient and repeated opportunities for transmission of the disease. (2) Sylvatic plague infection may be comparatively easily avoided if only the rural population is made aware of the danger of handling sick or dead *cus* and hares. (3) Sera and vaccines are not regarded by the author as useful prophylactics, nor do the authors regard with any favour quarantine, sanitary cordons of towns and cities, and closure of schools or offices. Nothing surpasses the simple, absolute isolation of patient or suspect in hospital as the best measure of protection for the rest of the population. (4) Deratization is essential for towns and cities, to prevent communication of field rodent epizootics to the rat population, but there is little hope of dealing in the country with the vector fauna of sylvatic plague.

W. F. Harvey.

RAO, S R. Rôle of Field Rats in the Endemicity of Plague in H.E.H. the Nizam's Dominions. *Indian Med Gaz* 1947, Feb, v 82 No 2, 96-9.

It has long been matter of debate why the rats of plague ridden Bombay

"the fact of the field rats in this area being highly susceptible to plague infection, indicates that these have not been in frequent contact with plague infection and as such could not be the cause of endemicity in this area" This negative conclusion when taken in conjunction with the finding that "rats

PRINCE, F M & WAYSON N E. Plague—the Survival of the Infection in Fleas or Hibernating Ground Squirrels. *Pub Health Rep* Wash 1947, Mar 28, v 62, No 13 463-7

Plague is carried over the hibernating period of ground squirrels to become an active disease again and in the same locality when the awakening of the rodent takes place in spring. The authors have set up an experiment to determine the mechanism of the process. Six squirrels were used, and 600 fleas in 3 lots. Lot A 2 normal squirrels, on each of which 100 fleas infected by feeding on infected mice were placed. Lot B 2 infected hibernating squirrels, each having been inoculated with 0.1 cc of a plague culture in broth; 100 normal fleas were placed on each squirrel. Lot C 2 normal squirrels and 100 normal fleas on each squirrel. Artificial arrangements were made for hibernation at 40°F and at the end of the 4 month period allowed, the squirrels were awake. The results obtained, although not conclusive, are interesting and the experiment is being repeated. In Lot A, neither squirrel became infected, but one of the 14 fleas that remained alive retained *P. pestis* in a virulent form and produced plague when injected into a white mouse. In lot B one of the two squirrels died of plague. 23 fleas were recovered alive and were plague free. In lot C 50 fleas remained alive and were able to reproduce.

Evidently "a flea will remain alive and infected with plague in a virulent form for a period of 4 months in the nest of a hibernating squirrel." Most of the fleas which were infected and remained alive did not retain the infection for the entire 4 months.

W. F. Harley

MEYER, K F. The Prevention of Plague in the Light of Newer Knowledge. Reprinted from *Ann New York Acad Sci* 1947 Apr. 10, v 48, Art 6, 429-67, 2 figs & 2 pls [69 refs]

A full half-century survey of the present pandemic of plague, begun in Hong Kong in 1894, brings to us an education and newer knowledge. The defence instituted against the "Black Death" of, (1) sanitation and improved housing, (2) notification, (3) quarantine, did not prevent the continuance of

plague. We can say, however, that plague will never cause the havoc it did 500 years ago. Can this result be explained by the displacement of the domestic rat by the sewer rat? Or by the displacement of the human parasites? Neither theory is supported by the evidence. The plague came from Europe and the Levant, and its spread was due to intrinsic natural causes.

The foundations of modern antiplague measures were the discovery of the bacillus and, with that, the institution of plague vaccination and serotherapy. Protective inoculation takes a premier place in prevention: yet it is not absolute, for re-infection may take place within a few months, nor have we any accurate information on the immunity enjoyed by persons who have recovered from plague. Controversy is still rife on what form protective inoculation should take—heat-killed broth antigen or agar-grown heat-killed bacilli? Scepticism arose over the significant value of killed bacilli or antigen which, though it is claimed that they reduced the risk of death from plague in British India to one-eighth, they reduced it in Java only by one-half or even only by one-third. This scepticism stimulated a return to trials of 40 years ago, of live avirulent organisms, and produced the "Tjiwidej" vaccine of Java and the "E.V." vaccine of Madagascar.

Such was the position of affairs when at the outbreak of the world war America decided to use formalin-killed agar-grown bacilli in carbolyzed saline suspension. Experiments on prophylactic immunization were continued and it was found that any plague antigen, or antigenic fraction, stimulated pro-

by any antigen, moreover, was greatly enhanced by synergists such as alum, which double the efficacy. It may be said that these experiments cast considerable doubt upon the reality of the fears expressed as to the efficacy of killed vaccines and upon the claims made for living vaccines: The tests "indicated that it is the actual mass of the bacterial protein rather than the method of preparing the dead antigens that controls the immunisatoric effect. . . . Conclusive evidence has been secured that dead plague antigens with proved immunogenic potency for mice and guineapigs stimulate, in approximately 70 per cent. of human volunteers, the appearance of weak protective antibodies. Further . . . a third injection of 'booster dose' definitely increases the level of the protective bodies." The indications are that the much-criticized prophylactic method of using agar-grown killed antigens would prove effective, if it were used before an outbreak, if inoculations were made repeatedly in dosage of at least 8,000 to 12,000 million bacilli and "provided frequent booster doses were administered."

This review goes on to approve of the usefulness of "rat campaigns in plague-free times which stress systematic building-out of rats supplemented by rodent destruction and the creation of deep rodent-free belts around endangered zones." It commends to special notice the newer rodenticides "Antu" and 1080, while DDT may "revolutionize the suppressive measures against rat-flea-borne plague." "It is not unlikely that domestic rodent plague is again entering a phase of decline . . . that urban plague, except for a few blighted areas remaining, is no longer a major problem."

Sylvatic plague, as might be expected, receives special emphasis. The saying "no rats no plague" is a slogan which "ignores the fact that wild rodents are potentially :
ence is made to the in :
seeking pelts, in 1910 :
and claimed 60,000 victims. It was not until 1908 that proof was obtained

in the United States that epizootic mortality among ground squirrels (*Citellus beecheyi*) was due to plague. Investigations led to the discovery of endemic or epizootic plague among at least 38 wild rodent species in 14 States of the United States. Questions naturally arise as to the potential dangers of sylvatic reservoirs and why, in the midst of epizootics when the fields and canyons may be littered with carcasses of dead squirrels, human cases fail to develop. This is still a mystery. Until the ecology of sylvatic plague has been thoroughly worked out, isolated observations will continue to serve as a reminder that the existence of plague in the fields and mountains of the Western States harbors as yet unknown potentialities.

W F Harley

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

STEWART G T The Carrier Rate of Intestinal Infections in Trincomalee *J Roy Nav Med Serv* 1947 Jan v 33 No 1 6-8

The author investigated the stools of 344 Asians and 274 Europeans in Trincomalee.

Examinations were made by means of wet films, concentration methods and cultures on MacConkey and desoxycholate citrate media.

The Asian group consisted largely of food handlers from various Service establishments. In 41 per cent trophozoites and in 99 per cent cysts of *Entamoeba histolytica* were found. Unidentified cysts were found in 46 per cent and other findings varied from 29 per cent of *Giardia* to 12.5 per cent of hookworms.

Of the persons harbouring *E. histolytica* 30 showed evidence of active infection and therefore 200 apparently healthy Asians were examined in order to obtain an estimate of the true carrier rate. This examination revealed the presence of *E. histolytica* cysts in 13 per cent and of unidentified cysts in 4 per cent.

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ment since given to the Asian food handlers. Finally, in the group of 274 European members of the Combined Services Hospital staff *E. histolytica* cysts were found in 16 (5.8 per cent) and unidentified cysts in 4 cases. The only other intestinal parasite encountered was *Giardia* in 4 cases. Active

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may well be that many members of the Services have returned to Europe unaware of their condition and of their infectivity to others.

He also notes the importance of the observed carrier rate among Asian food handlers, whose habits might lead to the transference of viable cysts even to cooked food, so that infected food was probably being served every day in every Service mess in the area.

[The indifference which many residents in the tropics frequently show to food sanitation, particularly in communal feeding centres, indicates the need for surveys of this nature to be undertaken widely and persistently.]

H J O D Burke Gaffney

SILVERMAN, D. N. & LESLIE, A. Intestinal Tumors of Dysenteric Origin. *J. Amer. Med. Ass.* 1947, Apr. 5, v. 133, No. 14, 994-8, 6 figs. [Refs. in footnotes.]

When intraperitoneal collections of inflammatory intestinal tumours are nature. In this paper, six cases of 1 as complications of amoebic or bacillary involvement of the intestines. Amoebic granulomata in the colon cannot be distinguished radiologically from cancer. Most cases which have been described, including two of the present series, were subjected to unnecessary laparotomy. As there is such a difference in therapy and prognosis, it is very important to distinguish between amoebic granulomata and malignant tumours.

One case of ileocaecal inflammatory tumour occurred in bacillary dysentery and one in a mixed infection of amoebic and bacillary. The first case of amoebic granuloma was detected in a white man of 19, in whom a filling defect was detected involving the caecum and ascending colon; special barium examinations revealed a constant irregular narrowing of the terminal 5 cm. of the ileum. Faeces culture revealed an organism of the *Sh. flexneri* group. One-stage resection of the tumour was performed with anastomosis of the ileum to the transverse colon.

In another somewhat similar case, *Sh. shigae* was isolated from the faeces, whilst the tumour, on surgical removal, proved to be amoebic. Unfortunately, the patient died and at autopsy the obstructing mass proved to be an amoeboma and there were multiple abscesses of the liver.

The authors question why sometimes amoebic infection of the colon takes the form of extensive ulcero-necrotic process, as in three fatal cases they recently described [this *Bulletin*, 1946, v. 43, 39] (in two complicated by concomitant infection with a dysenteric organism), whilst in others there is a granulomatous response.

Probably this is due to competition between the destructive activity of the amoeba and the regenerative power of the host. When the infection is sudden, there is no time for marshalling the defences against invasion.

The outstanding and almost is their response to specific therapy after the administration of emetine. The melting away of syphilitic granulomata after exhibition of iodides. [There are reasons for believing that this statement is not invariably correct.] Rectal scrapings, or even biopsy if a tumour is within reach of the sigmoidoscope, can be diagnostic—careful examination of a saline-purge stool will usually, in most instances of amoebic tumour, reveal *E. histolytica*, but in isolated instances, when these organisms are present only in the depths of the tumour mass, it may not be possible to demonstrate them, so that it is necessary to resort to specific therapy as a means of diagnosis.

P. Manson-Bahr.

ANDERSON, H. H., JOHNSTONE, H. G. & HANSEN, E. L. Experimental Chemotherapy of Amebiasis. *Amer. J. Trop. Med.* 1947, Mar., v. 27 No. 2, 153-60. [13 refs.]

While recognizing the value and limitations of emetine in amoebiasis, the authors have sought new and more effective agents for this disease. Drugs were first screened by an *in vitro* technique in which *E. histolytica* cultures grown with a single organism were exposed to the action of drugs at 37°C. for a period of 48 hours. To avoid the use of solid media which deviate drugs to a considerable extent, a liquid liver medium and a newly devised synthetic

liquid medium [not described] were employed. Some attention was also paid to the mechanism of drug action. By such methods the action of more than 200 chemical agents including that of subtilin on the parasite was studied.

in vitro tests treatment of monkeys infected with *E. histolytica* was carried out for periods of 5 to 30 days with the most promising substances. Generally examinations of a single faecal specimen were made over a period of six consecutive days. Examinations were similarly made from the day after completion of treatment and again 6 and 12 weeks later before a monkey was regarded as cured. Tests of liver and renal function and electrocardiograms were made during treatment. Carbarsone oxide proved an active substance in monkey infections as did two other trivalent arsenicals (thioarsenites) and the first was also effective in clinical trials in man. The authors consider that there is a definite correlation between the results obtained *in vitro* and in monkeys and it is hoped that it will hold in the case of man. A short summary is given of the possible mechanisms by which drugs exert their amoebicidal effects.

J. D. Fulton

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

MORENO BERDUGO J & INFANTE GÓMEZ A. Notas sobre una epidemia de fiebre recurrente en Villa Nador y su territorio. [Notes on an Outbreak of Relapsing Fever in Villa Nador and its Environs.] *Rev. Colonial* Madrid 1945 Nov-Dec v 6 Nos 5/6 336-63 11 figs. [25 refs.]

This outbreak which occurred in March-July 1945 comprised 168 cases under the authors' observation, 108 in the Villa Nador district and 60 in Druch. The spirochaete present was not determined. *Sp. hispanica* would be expected but *Ornithodoros* was not found. Ixcs however were abundant. Infection spread rapidly among the army; there had been 209 cases up to the end of August. It is thought that infection was primarily introduced by persons

the symptoms were

as many as eleven

in three cases and 12, 14 and 15 respectively in three others. Many of the patients showed a high pre-critical rise of temperature (well shown in some of the charts); the afebrile period was 5-8 days and the first relapse 2-5 days. About one-fourth of the patients showed a petechial rash and 47 per cent a labial herpes. Splenomegaly was not marked and practically all with this sign had more or less recently suffered from malaria. Of complications a tendency to haemorrhage was noteworthy: profuse epistaxis, menorrhagia, haemoptysis (rarely) and in one patient haematuria. Red corpuscles were reduced to about $2\frac{1}{2}$ million (the lowest was 1,960,000) per cmm; most patients had a mild leucocytosis up to 13,000 but 11.8 per cent showed a degree of leucopenia with reduction even to absence of eosinophiles. There was only one fatal case.

H. Harold Scott

PINTO, M. R. Caractéristiques d'une souche de *Borrelia recurrentis* isolée au Portugal. [Characteristics of a Strain of *Spirochaeta recurrentis* Isolated in Portugal.] *Arquivos Inst. Bact. Câmara Pestana*. 1945, v. 9, No. 2, 224-7.

The author gives the characteristics of a spirochaete isolated from a patient who worked as a weeder and mower on a farm near Lisbon, described by FONSECA, LACERDA and PINTO in 1942 and 1943 [*Medicina Contemporanea*, 1942, v. 60, 299, & 1943, v. 61, 78.] The strain resembles *Spirochaeta hispanica* in its general characters including pathogenicity to laboratory animals. Cross-immunity tests were made with a strain from Madrid, and animals immune against the Lisbon strain were susceptible to the Spanish strain, and conversely those immune against the latter could be infected with the Lisbon strain. *E. Hindle.*

CULWICK, A. T. & FAIRBAIRN, H. Polymorphism in *Treponema recurrentis* and *Spirochaeta vincenti*. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 1-5, 4 figs.

The electric charge of stained specimens of *Spirochaeta recurrentis* was determined on thin blood films in the manner described for trypanosomes [this *Bulletin*, 1947, v. 44, 649], and the lengths of 774 of these two electrical variants were measured. The length distributions were analysed, and were found in each case to consist apparently of three populations with lengths distributed normally about the means. The sum of the frequencies of the calculated curves fitted closely to the observed values. *S. recurrentis* is thus assumed to consist of six types of individual—short, intermediate and long forms, each of which may bear either a positive or a negative electric charge.

Trypanosoma rhodesiense was found by the authors (*loc. cit.*) to contain the same six forms, and they suggested that these types were maintained by a process of syngamy. The suggestion is now put forward that the occurrence of such forms in *S. recurrentis* may be evidence that this organism also undergoes syngamy.

The lengths of 778 *Spirochaeta vincenti* from a throat swab were next examined, and in this case a series of three normal curves was found to give a good fit to the observed measurements. The electric charge could not be determined, so no decision could be reached as to whether each of the short, intermediate and long forms was composed of a single type or was an admixture of positively and negatively charged variants with mean lengths close together.

J. C. Broom.

i. WITTEBOLLE, P. Tentatives de culture et d'infection au moyen d'un à plusieurs éléments filamenteux ou granulaires de *Borrelia duttoni*. [Attempts at Culture and Infection by means of one or several Filamentous or Granular Forms of *Spirochaeta duttoni*.] *Acta Biol. Belgica*. 1943, v. 3, Nos. 3/4, 190-91.

ii. — & BAERT, H. Obtention de sous-cultures au moyen d'un seul élément filamenteux ou granulaire de *Spirillum bruyinoghei*. [The Production of Subcultures by means of Single Filamentous or Granular Forms of *Spirillum bruyinoghei*.] *Ibid.* 188-9.

i. The first paper comprises the results of attempts to produce cultures and also to infect mice from tissues of *Ornithodoros moubata* infected with *S. duttoni*. These tissues never showed filamentous [=spirochaetal] forms, but only granules. All attempts to obtain cultures from them were unsuccessful, but subcutaneous inoculation of 0.1 cc. of an emulsion of the tissues into mice produced infection with spirochaetosis.

It required at least 100 filamentous forms isolated from the blood of an infected mouse to transmit the infection but no reaction followed the inoculation of a similar number of culture spirochaetes

succeeded four times in obtaining cultures of spirilla by the inoculation of a single granule only 0.2μ in diameter. They also succeeded in obtaining cultures by the inoculation of single spirillar forms. They consider that their technique excludes the possibility of an invisible stage of the organism. They are also of the opinion that their results prove that the granules not only of spirochaetes but also of spirilla are not degenerative forms but a stage in the development of the filamentous spiral form. E Hindle

SCHWEITZ J. Sur plusieurs foyers de spirochetose du Congo oriental. [Several Foci of Spirochaetosis in the Eastern Congo. *Acta Biol Belgica* 1942, 2 No 3 326-9]

Ornithodoros moubata is common but unevenly distributed in the eastern

these ticks

The ticks were found in five foci on the eastern border of the Congo namely Nyirigezi Nzulu Kisenvi Gety and Bogoro. No cases of relapsing fever were found and blood examination of 485 inhabitants was negative.

Attempts to transmit the spirochaetes to rats were only successful when large numbers of fully-developed adult ticks were used. When a few adults and more especially nymphs were used the experiments were almost entirely negative. Only a certain proportion of the *O. moubata* in these foci were thus found to be naturally infected. H J O D Burke-Gaffney

BRUNOGHE G & ROUSE M. Spirille pathogene. [A Spirillum Pathogenic to Man. *Acta Biol Belgica* 1942, 2 No 2 187-9]

The authors isolated a spiral organism in pure culture from the blood of a febrile patient after 9 days incubation in blood broth.

Young cultures consisted of short forms having 1 or 2 spirals and showing rapid movement comparable to *Spirillum minus* but they were short enough to be confused with vibrios. In older cultures longer forms were seen containing from 13 to 15 spirals (average 6 to 8) and showing a slower corkscrew movement. The organism was easily cultivated in broth enriched with blood in ordinary broth aerobic culture was not satisfactory but anaerobically abundant serial cultures were obtained especially when 0.1 cc of 0.1 per cent ascorbic acid was added to the medium. After several passages in blood agar anaerobic and aerobic growth developed on plain agar the forms thus obtained were all short but typical forms were obtained on subculture in blood broth.

The authors hesitated in classifying this spiral organism either as a spirochaete or a spirillum: they therefore examined its behaviour in bile and saponin; no lysis occurred in either.

The organisms proved to be non-pathogenic to rabbits, guineapigs, white mice and rats, the first named having been injected intravenously, and the others intraperitoneally.

The patients' serum, taken 12 days after "septicaemic symptoms" agglutinated the organisms in a dilution of 1/3,200: they were lysed at 1/400. Two months later, agglutination took place at 1/400 to 1/800, but no lysis occurred.

The authors note that, apart from *S. minus* "which is not cultivatable" [this statement is open to doubt], they are unaware of similar organisms having been described as pathogenic. They consider that this organism resembles in many respects the organisms described by PONS as *Spirochaeta sinensis* [this *Bulletin*, 1924, v. 21, 471] and by TROISIER [*ibid.*, 1937, v. 34, 708] as *Spirochaeta haemophilus*, but it is distinguishable from these by the fine flagella and certain minor metabolic differences, which are being studied and which will be made the subject of a further report.

H. J. O'D. Burke-Gaffney.

LEPROSY.

AMARO FERNÁNDEZ, J. M. Contribución al estudio de la lepra en Marruecos. El subfoco Jaldi. [Leprosy in Morocco. A Sub-focus in Jaldi.] *Med. Colonial*. Madrid. 1946, Aug. 1, v. 8, No. 2, 127-45, 4 figs. [22 refs.]

In the Gomara area of Spanish Morocco, leprosy is known to be endemic; just to the north of this lies Jaldi, and the author has found that the disease is present there also. The inhabitants are pastoral and agricultural. Ten cases are considered in this paper, one female and nine males; as for age, one was in each of the second, third and fourth decades, three in the fifth, two in the sixth, and two were over that age. Various degrees and types were seen; three are classed as L_1N_2 , two as L_2N_1 and one each as L_1N_1 , L_2N_1 , L_2N_2 , L_1N_3 and L_2N_3 . Six have died, three after less than three years' illness and three others before the tenth year of their disease.

H. Harold Scott.

IGNACIO CHALA H., J. & LLERAS RESTREPO, F. Ensayos con leprominas filtrada y bacilar desintegrada. (Reacción precoz.) (Nota preliminar.) [Tests with Lepromio Preparations.] *Rev. Facul. de Med.* Bogota. 1947, Jan., v. 15, No. 7, 442-64, 2 figs. & 4 charts. [70 refs.] English summary.

After preliminary remarks on the Mitsuda lepromin reaction, the authors describe three lepromin preparations used by them in these tests. They emphasize that the intradermal lepromin test is *not* a diagnostic measure, but is useful in classifying the type of disease, and in determining its severity, evolution and prognosis.

In the present series of experiments three preparations were used: Whole lepromin, filtered lepromin, and bacillary disintegrate lepromin.

1. *Whole lepromin* (lepromina integral) prepared from lepromata rich in bacilli, in patients who had had no treatment. The tissue is boiled in physiological saline for one hour, then cut into small pieces, dried *in vacuo* and ground to powder in a mortar. Saline is then added in proportion of 10 cc. to 0.4 ggm. of the powder and the mixture again ground up, allowed to settle and the

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supernatant fluid decanted this process is repeated several times To the final product 0.5 cgm phenol (or merthiolate) is added to every 100 cc and put up in ampoules of 1-5 cc and sterilized at 120 C. for 45 minutes

2. *Filtered lepromin*—The leproma after being boiled and cut up is triturated to a paste and filtered and the filtrate concentrated to one-tenth and the sterilized. It is then put up in ampoules and

3. *Bacillary lepromin*—The leproma is triturated and chloroform added (20 cc to each gramme of tissue) the chloroform is separated the whole evaporated in a waterbath the residue is suspended in ether, centrifuged to throw down the bacteria the ether is decanted and suspended in phenol saline deposit (extracted bacilli) triturated as before.

sterilized after putting in ampoules as before.

With each 0.1 cc is injected intradermally into the scapular area The early reaction is noted after 48 hours and is regarded as positive if there is an erythema more than 4 mm in diameter with an infiltrated centre The late or delayed reaction is noted in four weeks and in a strongly positive case presents a papule or nodule of 5 mm or more perhaps with central necrosis or ulceration.

The results in different types of leprosy are noted and the author makes the following conclusions—

1. The early reaction to filtrate and bacillary disintegrate antigens has the same significance as the Mitsuda reaction whether positive or negative, and without the undesirable effects of the latter test the early reaction with whole lepromin sometimes had the same value as the Mitsuda.

2. The disintegrate antigen is more active and produces more intensive early reactions than the filtrate

3. The early reaction with filtrate and bacillary antigens to both of importance in clinical selection of cases.

4. Strongly positive results are obtained with early reactions to both of these antigens and with late reactions to whole lepromin in typical tuberculoid leprosy simple macular or anaesthetic neural types give negative or slightly positive results

5. Focal reactions in cutaneous lesions were sometimes met in tuberculoid cases especially with the bacillary antigen

6. The use of bacillary disintegrate antigen is recommended for routine work

Percentages are given in support of the results and the reactions are illustrated by photographs but the totals on which the percentage figures are calculated are not given

H. Harold Scott

W. E. The Sulphone Treatment of Leprosy Brit Med J 1947 June 7, 788-801

BRITISH MED J 1947 June 7 S13-14 Leprosy and its Problems.

This paper deals mainly with reports on trials of these drugs by American workers at Carville and by W. E. in Trinidad which have already been reviewed in the Bulletin see 1946 x 43 4-8 1947 x 44 326-327 The drugs are of special value in advanced lepromatous cases in which chaulmoogra preparations commonly fail and for eye complications which have hitherto usually gone on to produce total blindness but whose progress can be stopped and some improvement be effected by the intravenous use of promin or oral administration of diasonone They appear to act through preventing the production of new lesions by the dissemination of lepra bacilli through the blood stream often accompanied by the gradual death of the organisms in the old lesions In advanced

lepromatous cases, the treatment has to be continued for four or five years, but FAGET has now reported 19 cases treated with promin which have been bacteriologically negative for 1-2½ years without any relapses; diason treatment has not yet been used for such long periods, but appears to be equally effective so far. Muir now reports that a few early war-time lepromatous infections have been cleared up within four to six months. The drugs at present cost £6 per case per year. The patients must be carefully watched for the occurrence of anaemia, which requires temporary cessation of the drugs and the giving of iron and liver treatment. Others of this series of drugs are now available for trial, so it is hoped that even more effective ones will be discovered and that with increasing demand they may become available at lower prices. The early discovery of cases, through regular examinations of all known contacts with infective patients, will continue to be necessary to allow of early and more economical treatment. This would tend to prevent the development of the most highly infective stages of cutaneous cases, and lead to eventual disappearance of the main sources of infection and the rapid reduction of the incidence of leprosy during the next few decades.

L. Rogers.

HELMINTHIASIS.

MEIRA, J. A. Tratamento das verminoses. [Treatment of Helminthiasis.] Reprinted from *Rev. Gazeta Clinica*. 1946, May-June, v. 44, Nos. 5/6, 93-121. A review of current therapy.

SCHWETZ, J. & DARTEVELLE, E. Sur les mollusques trouvés dans plusieurs foyers de bilharziose intestinale de la bordure orientale du Congo belge. [Snails found in certain Foci of Intestinal Schistosomiasis on the Eastern Border of the Belgian Congo.] *Acta Biol. Belgica*. 1942, v. 2, No. 1, 51-4.

In Bobandana the authors found *Planorbis choanomphalus*, *P. stanleyi* and snails of other genera; in Irumu *P. adovenensis* and *Physopsis africana*; in Mongbwahu *P. adovenensis*. At Kasenyi on Lake Albert the position is complex, and here the schistosomiasis infection rate in the population is from 25 to 40 per cent. *P. boissyi tanganyicus*, *P. choanomphalus*, *P. stanleyi* and *P. adovenensis*, all known intermediate hosts of *S. mansoni*, are found in a river flowing into the lake. It had formerly been thought that infestation here was closely correlated with the fishing industry in the lake, but it now seems more likely that infection is contracted by villagers when they bathe in the river, rather than while fishing in the lake.

Two genera of small snails, *Gyraulus* and *Segmentina*, are also found, but their rôle in transmission is not known. Charles Wilcocks.

SCHWETZ, J. & DARTEVELLE, E. Sur l'écologie de quelques Planorbes du Congo oriental. [The Ecology of several Species of *Planorbis* in the Eastern Part of the Belgian Congo.] *Acta Biol. Belgica*. 1943, v. 3, Nos. 3/4, 298-301.

The authors have examined collections of species of *Planorbis* found in the Belgian Congo; they give the following information about them:—
P. salinarum Morelet has been found in foci of *S. mansoni* infection in Bas-Congo; it also occurs in Western Congo and Katanga. *P. katangae* Haas is found in the south. These two species live in rivers, streams and ponds.
P. tanganyicus Bourguignat [? *P. boissyi tanganyicus*, see preceding abstract]

(and the related *P. sudanicus* \ Martens) *P. smithi* Preston *P. choanomphalus* \ Martens *P. stanleyi* E. A. Smith (*P. boudouxi* Bourguignat) and *P. adouensis* Bourguignat are confined to the eastern part of the Congo. *P. adouensis* is a riverine species. *P. smithi* and *P. choanomphalus* are lake species. *P. tanganikensis* is probably chiefly a lake species. *P. stanleyi* is eclectic—it inhabits lakes, ponds, and streams.

Two small planorbid, *Gyraulus* and *Segnentina* are found in Bas Congo and in the marshes and streams about Lake Albert as well as in the lake itself.

Charles W. Ilcocks

PONCE PINEDO A. M. Schistosomiasis Mansonii in the Republic of Santo Domingo. With a Report of Six Cases studied. Puerto Rico J. Pub Health & Trop Med 1947 Mar \ 22 No 3 308-15 [Refs in foot notes Spanish version 316-24]

The author shows that early reports of *S. mansoni* infestations discovered in the Republic of Santo Domingo cannot be regarded as evidence of autochthonous infection since there was no proof that the patients had not been infected elsewhere. He describes the first autochthonous case diagnosed in 1942 and five other cases seen by him. These patients and some others all lived in the Hato Mayor area of the Dominican Republic and in a small creek in that area the author found innumerable *Australorbis glabratus* of which some 5 per cent were infected with fork-tailed cercariae. From these snails rabbits were successfully infected and adult *S. mansoni* were recovered from them.

Charles W. Ilcocks

PRATT Caroline K. & OLIVER GONZALEZ J. Intradermal Reactions to Fresh and Stored Antigens prepared from Cercariae of *Schistosoma mansoni*. Puerto Rico J. Pub Health & Trop Med 1947 Mar \ 22 No 3 254-6 [Spanish version 257-9]

The authors compared the potency of antigens prepared from *S. mansoni* cercariae when these were used fresh and after storage at 6°C for 3, 6, 9 and 12 months.

The dry cercariae powder from which the antigen was prepared had been made from cercariae collected on different occasions over 2 years. The antigen was used for skin testing in a dilution of 1/10,000. The tests were done on patients who showed *S. mansoni* ova in their stools; each patient was tested with one or more batches of the fresh and stored antigen and with a saline control. Skin tests were made upon about 40 patients at each of the four periods. The results which are tabulated indicate that no loss of potency occurred during storage for the periods stated. Between 93 and 100 per cent positive tests were obtained whether fresh antigen or that stored at 6°C for 3-12 months was used.

H. J. O. D. Burke Gaffney

ALVES W. & BLAIR D. M. Diagnosis of Schistosomiasis. Intradermal Test using a Cercarial Antigen. Lancet 1946 Oct 19 556-60 [18 refs.]

Schistosomiasis is found practically everywhere in Southern Rhodesia but the incidence varies from place to place. Any plan of mass treatment must therefore be preceded by diagnosis but the usual methods of examination of excreta are costly of time, staff and equipment and may fail for several reasons. Because infection may be by worms of one sex only, because there is a natural rhythm in the production of eggs because the female worm may be in an unusual position because the eggs may be unable to escape because the specimens may be collected in the wrong way or because too few specimens

may be examined. To detect *S. mansoni* in faeces, some workers break up the faeces in salt solution, and thus hatch out the eggs; the miracidia can then be observed [see SENRA, this *Bulletin*, 1942, v. 39, 698]. This is impracticable in the field in *S. Rhodesia*.

To overcome these difficulties, various attempts have been made to use skin tests, or other tests, in diagnosis, and the authors describe the preparation of an antigen for a skin test. Snails (*Physopsis* spp.) are collected from slow streams, and are placed in tubes of pond water, in the sun. About 10 per cent. can be seen shedding cercariae within 48 hours; these are transferred to fresh tubes (3 in. x 1 in.) containing water, one snail to each tube, and are kept thus until many cercariae can be seen—one snail may give 3,000–4,000 cercariae in 48 hours. The snail is then taken out, and the water is filtered through fine muslin, which allows the cercariae to pass; the filtrates are pooled and passed through filter paper, which holds back the cercariae. The authors aim at about 10,000 cercariae per circle of 15 cm diameter of filter paper. These papers are dried and stored. To prepare the antigen, squares of 1 cm. are placed in a flask with enough 1 per cent. carbolf saline to give about 2,000 cercariae per cc.; the flasks are shaken from time to time, and left to stand, the surplus fluid is decanted and saved, and the wet filter paper is squeezed out. This is the antigen, it is passed through a Seitz filter and diluted with an equal volume of saline, so that the final product contains 0.5 per cent. phenol and the extract of about 1,000 cercariae per cc. It is stored in the cold, and does not lose potency for 6 months. Before use, each batch is tested on a known positive and a known negative person.

The authors realize that with these snails, cercariae of *S. haematobium* are usually present, but on epidemiological grounds they think that *Physopsis* may be a host of *S. mansoni*, this is of no moment for the present work, since it is well known that there is a common antigenic factor in the schistosomes.

The test is made intradermally, the aim being to inject 0.01 cc. only. It is read in 10, 15 and 20 minutes, and a positive result is indicated by a raised, button-like weal, which may have pseudopodia. This test was carried out in 592 subjects (European and Eurafrican boys, and African young men), and stool and urine specimens were examined, several times if the test was positive. No negative skin test was encountered in a person shown to be passing eggs, and in spite of the fact that specimens from negative reactors were examined only once, the authors think that, had the test been less sensitive, some such negative results would have occurred. They therefore think it justifiable to regard negative reactors as free from infection. In spite, also, of the fact that eggs were not always found in positive reactors, the proportions showing eggs increased as more specimens were examined, and a positive test is therefore regarded as sufficient evidence to indicate a course of treatment in a patient with a suspicious history. In persons who have been treated and cured, the test may remain positive for about 2 months, but probably not much more. A persistently positive test is therefore an indication for a second course of treatment.

This test forms an admirable "screen", in mass treatment campaigns.

[See also ALVES & BLAIR below.]

Charles Wilcocks.

ALVES, W. & BLAIR, D. M. Schistosomiasis: a Review of Work in Southern Rhodesia in 1946. *South African Med. J.* 1947, May 24, v. 21, No. 10, 352–7.

This is a report of the work of the Schistosomiasis Research Unit of the Public Health Department of Southern Rhodesia. In 1946 a "pilot unit", composed of Alves, with a European field assistant, 6 African snail collectors

and 8-12 African medical orderlies trained to give the slow intravenous injections of sodium antimonyl tartrate worked in certain parts of the country. The object was to synchronize the treatment of as many infected persons as possible with the clearance of collections of water in the same area. In treatment people who showed a positive reaction to intradermal injection of an antigen prepared from schistosome cercariae were given sodium antimonyl tartrate in a total dose of 1 grain to 20 lb of body weight, the total being divided into three parts given at intervals of 3 hours and injected very slowly. The weights of the patients were estimated on a general appraisal. In this way 5-455 people were treated and there were no fatalities. One serious reaction occurred in a boy, but the drug was stopped at once and he recovered coughing and vomiting occurred in a number of cases but rarely in children. One operator can handle 24 patients satisfactorily in one day, 8 each hour but not more. In one area the cost of orderlies' wages and drugs came to 3d per patient.

The authors quote the experience of a rapid form of treatment reported by ROSTON of Salisbury, whose patients were Europeans. He takes them into hospital on Friday, gives a total dose of 1 grain to each 12 lb body weight, divided into 5 or 6 doses on the Friday and Saturday, the patients rest in bed on Sunday and return home on Monday. As much as 16 grains have been given to one patient.

One death was reported during the year; the patient was an African woman and at post mortem examination it was not by any means certain that the antimony treatment was the cause of death. A failure rate of 2.44 per cent is recorded for observations lasting 3½ months; this is evidently satisfactory in a country where opportunity for reinfection is abundant.

The skin test is a very effective method of detecting infection but it must be done and read with care. The injection must be intradermal and the test must be read not sooner than 10 and not later than 15 minutes after the injection. This is most important. Difficulty has been experienced in the hands of some other workers, probably owing to faults of technique and the authors say that in the individual case the test should be used as an aid to diagnosis, not as the sole criterion, but it is an admirable screen for the purpose of mass treatment.

Results with this test showed infection in 24-41 per cent of Europeans and in 17-89 per cent of Africans. Children gave the lower figures in each case; the rates in adolescents and adults were similar. Adolescent girls who do the washing and water carrying have high rates. This test detects infection by either *Schistosoma haematobium* or *S. mansoni*, both of which are found in S. Rhodesia.

For snail control the unit made use of copper sulphate, which in their own laboratory tests had been found to be several hundred times more effective than malachite (a mineralized copper carbonate). See MOZLEY, this Bulletin 1942, 39-11, 1945, 42-516. A concentration of 5 parts per million of copper sulphate kills 100 per cent of snails in 24 hours in the laboratory. The authors use it in solution in a knapsack sprayer. The dose is calculated for the water concerned and the solution is sprayed with care to cover as wide an area as possible. In water in which deliberate fish culture is carried out there may be some fish mortality and the need for fish must be balanced against the risk of schistosomiasis.

ALVES (below) has pointed out that, contrary to general opinion, schistosome cercariae may live much longer than 48 hours—cercariae of *S. bovis* have been found alive for more than 120 hours and effective at 96 hours in the colder months, though they live only at 48 hours in the hot season.

The authors point out that the major part of control work should be done between March and October, in S. Rhodesia (the dry season); snail-gangs may be trained for malaria work in the wet season. They conclude that the experience of the pilot unit shows that "intensive attack on a given area is not only possible but practicable." [It is a vigorous attempt to deal with a massive problem.]

Charles Wilcocks.

ALVES, W. Recent Advances in the Study of Bilharziasis. *Proc. Rhodesia Scient. Ass.* 1946, Apr., v. 41, 1-6.

This is a lecture in which the author describes much of the work referred to in the papers abstracted above. He records the important finding, recently made by GORMAN in the Bilharzia Research Laboratory, that schistosome cercariae will live in cold weather for 144 hours, and have been found infective at 96 hours. He points out that this fact contradicts the usual teaching that water stored for 48 hours in a tank free from snails is always safe, from the point of view of schistosomiasis. It may be so in hot weather, but not in cold.

Charles Wilcocks.

SEITZ, E. Intensive Kurzbehandlung von Schistosomiasis (Bilharzia) mit Antimonsalzen. [Intensive Short-Course Treatment of Schistosomiasis with Antimony Salts.] *Acta Tropica*. Basle. 1946, v. 3, No. 2, 155-7.

The author writes from Mnyusi, Tanganyika Territory. He has treated 322 patients, suffering from schistosomiasis (14 *S. mansoni*, the remainder *S. haematobium*) by an intensive course of intravenous injections of sodium antimonyl tartrate (8, or later 6, injections in 30 hours) similar to that used by ALVES and BLAIR [above, and this *Bulletin*, 1945, v. 42, 815; 1946, v. 43, 344]. The total dose was 12 mgm. per kgm. body weight; the solution was freshly made each day and each dose was diluted to 10 cc. in 5 per cent. glucose saline (later in 1.4 per cent. NaCl). The injections were given very slowly.

Of these 322 patients, 307 were examined four weeks later, and 216 eight weeks later; 4 and 3, respectively, were then positive.

No serious reactions were experienced, but some patients vomited; most of these had hookworm infestation, and low haemoglobin values. Later, therefore, the author treated those with hookworm first for that condition, before giving the treatment for schistosomiasis. [He is evidently favourably impressed.]

Charles Wilcocks.

RODRIGUEZ-MOLINA, R. & SCHWACHMAN, H. Fuadin Therapy in 150 Cases of Schistosomiasis Mansoni with a Follow-Up Study of 70 Cases. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 117-27. [13 refs.]

The authors were stationed at an American Army Hospital in Porto Rico, where schistosomiasis mansoni is endemic. No case of schistosomiasis was detected in the large number of American troops from the U.S.A. who were there for periods up to three years. In 1944, routine examination for the Army of 15,831 local men, between the ages of 18 and 38 years, showed 2,326 (14.6 per cent.) to harbour the infection. These cases were diagnosed on a single stool examination by means of a concentration technique, and the men had probably acquired their infections in childhood. During the last two years the authors have treated 150 of these men for their schistosomiasis, with Fouadin, at the 161st General Hospital. Full examinations were made and a close watch was kept on the progress of the patients, 40 per cent. of whom were in hospital for conditions other than the schistosome infection, which was diagnosed fortuitously on routine stool examination; the remaining 60 per cent. were

suffering from mild or moderately severe manifestations of schistosomiasis. Late stages of infection with a Banti like syndrome were not included in this study. The symptoms and signs evident in the infected are listed and the presence of concurrent parasitic infestations is noted. A course of treatment consisted of a total of 45 cc of Fouadin given intramuscularly daily over a period of ten days. Toxic effects of the treatment were observed in 20 per cent of those receiving it but these were mild in all but two cases. In one of these latter a severe febrile reaction with abdominal pain and a leucocytosis (34 000 per cmm) and high eosinophilia (79 per cent) lasting for 10 days followed the fourth injection (after a total of 15 cc Fouadin). In the other after the ninth injection a large painful swelling occurred in a buttock associated with a daily temperature to 103°F and a leucocytosis (19 000 per cmm) and eosinophilia (21 per cent). No pus was obtained on incision which showed only oedema and induration of the tissues. The local and systemic conditions subsided in 6 days.

Examination of five stool specimens immediately after a single treatment showed that 114 (76 per cent) of the 150 men were no longer passing ova in the stools. 15 of 21 men re-treated with a second course of Fouadin were similarly stool negative. Thus 86 per cent of the men were stool negative immediately after one or two courses of the drug. Seventy men were followed up for one to 24 months after treatment with from one to six courses of Fouadin (45 to 270 cc) and 39 (55.7 per cent) of these were found on stool examinations not to be free of their infections. The end results of Fouadin treatment therefore were not particularly good and the undesirability of assuming the success of treatment on stool examinations done immediately after its completion was obvious.

A R D Adams

OLIVER GONZÁLEZ J & HERNÁNDEZ MORALES F. Quantitative Determination of *Schistosoma Mansonii* Ova in Feces from Patients under Treatment with Antimonial Drugs. *Puerto Rico J. Pub. Health & Trop. Med.* 1946 Dec. v 22 No 2 210-16 2 figs. [Spanish version 217-23]

No quantitative determinations have yet been made which indicate the relationship between the number of live and dead eggs of *Schistosoma mansonii* passed in the faeces of untreated patients nor do we yet know whether dead eggs increase in number as the result of treatment or whether the treatment causes the flukes to lay dead eggs only. Existing methods of counting schistosome eggs do not give consistent quantitative results and cannot be used for counting live and dead eggs separately. In the present paper the authors describe a counting method which they claim enable reasonable quantitative determinations of live and dead eggs to be made and these reveal interesting facts about the effects of antimonial treatment.

Briefly the counting method is as follows. Enough of the faeces passed during 24 hours previously mixed is put into a displacement (Stoll) flask filled with water to the 56 ml mark to raise the level of the water to 60 ml. About 4 gm. of faeces produce if the flask is shaken for 10 minutes a wire sieve (50 meshes to the in to 40 ml markings (Stoll tube). Then the liquid above the 15 ml mark is siphoned off and the sediment in

the average of the two is taken and the result can be expressed either as eggs per ml. of suspension, per gm. of faeces, per ml. of faeces or per 24-hour specimen of faeces. Conversion to a formed-stool basis is obtained by multiplication of the number of eggs by 1 if the stool examined is formed, by 2 if it is mushy and by 4 if it is liquid. SCOTT [this *Bulletin*, 1938, v. 35, 596] has pointed out that the egg output is less variable when it is expressed in terms of eggs per ml. of stool than when it is expressed in eggs per unit of time. The number of eggs per gm. of stool can be converted to eggs per ml. by the use of the common specific gravity factor 1.04, which changes stool weights to ml. [see STOLL & HAUSHEER, this *Bulletin*, 1926, v. 23, 776].

The 40 patients treated by the authors were kept in hospital for 2 to 3 weeks; they were from 18 to 33 years old and they had lived most of their lives in an area in which schistosomiasis is endemic. Eleven were treated with neostibosan, eleven with stibanose, twelve with urea-stibamine and six with anthiomaline. Three examinations of each patient were done before treatment and one each day after it until the patients were discharged.

The authors conclude that their technique makes possible a satisfactory study of the relationship between live and dead eggs in treated and untreated patients.

simultaneously from the faeces and dead eggs did not persist in the faeces. Out of 12 patients treated with urea-stibamine no live or dead eggs were found in 3 patients at the end of treatment nor in the other 9 one month after treatment. These patients treated with anthiomaline and urea-stibamine remained negative for 6 and 8 months respectively. This simultaneous disappearance of live and dead eggs after treatment with these drugs suggests that the dead eggs are either laid dead by the flukes or die during their transit from the site at which they are laid. Dead eggs found in faeces are not therefore necessarily eggs which have remained for long periods of time in the intestinal mucosa. In 29 out of 40 (72.5 per cent.) patients the number of dead eggs in the faeces was greater than the number of live ones; but the relationship between live and dead eggs may be different in patients belonging to other age groups or with varying degrees of infection.

An evaluation of the efficacy of anthiomaline and urea-stibamine has been reported by HERNÁNDEZ MORALES *et al.* [this *Bulletin*, 1947, v. 44, 218]. Similar reports on the efficacy of neostibosan and stibanose will appear later.

G. Lapage.

CAIRO: MINISTRY OF PUBLIC HEALTH. MEDICAL AFFAIRS. 3rd Annual Report of the Bilharzia Snail Destruction Section, 1944-1945 [BARLOW, C. H. (Expert) & ABDEL AZIM, M. (Director)]. 28 pp., 4 folding maps & 2 charts. 1947, Cairo: Govt. Press.

Satisfactory progress is reported of the snail destruction campaign in the Fayoum and in Giza Province and an account is given of the results of a survey and treatment of streams in Dakhla Oasis where the infection rate in the population is about 3 per cent. The infection has been known also to exist in Kharga Oasis, half-way between Dakhla and the Nile Valley and it is proposed to begin a survey in this locality.

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Ballâna and Dakka showed heavy infestations with *Bulinus*. The topography of this area is discussed in relation to the proposed snail eradication procedure. Below the dam, snail surveys have been carried out at the important agricultural areas centering around the towns of Kom Ombo and Edfu and the whole district is now under treatment.

a high per cent retardation of the intra-uterine of hibernating snails with copper-sulphate actively thriving snails. The effect is less marked in the case of *Bulinus*.

A snail survey of the Nile itself in Giza Province revealed that the Nile is only of secondary importance in restocking the irrigation streams.

J. J. C. Buckley.

CAIRO MINISTRY OF PUBLIC HEALTH MEDICAL AFFAIRS 4th Annual Report of the Bilharzia Snail Destruction Section 1945-1946 [ABDEL AZIM, M. (Director) & BARLOW, C. H. (Expert)] 28 pp. 3 maps (1 folding) & 2 charts 1947 Cairo Govt Press

The Snail Destruction Section reports improved organization and control during 1945-1946 in all the Provinces embraced by the campaign. In the Fayoum, the use of palm leaf traps in streams lacking vegetation, is described as advantageous and the results of this method are tabulated. The course of the campaign up to 1946 in Fayoum and Giza is illustrated graphically in regard to the ratio of streams infested to streams surveyed, and shows reductions of from 25 per cent to 2 per cent in Fayoum and 39 per cent to 12 per cent in Giza. In Aswan Province, difficulties of organization and co-ordination with agricultural and irrigation necessities have been encountered but marked reduction in the snail population has been effected. The campaign in the oases continues actively and now includes Bahariya and Kharga.

In the Research Section, the relation of age of cercariae to power of penetration has been investigated. Exposure of experimental animals to cercariae of *S. haematobium* resulted in successful infection of all the animals with cercariae of varying ages up to 24 hours. Cercariae aged 30 hours produced male worms only and no infection followed exposure to cercariae in liquid and in powder form, pure caustic potash, lime bleaching powder and DDT was tested experimentally on snails and the weed *Polamogelon crispus* and the results are described. Taking into consideration the local cost of these agents, it is concluded that no advantage would be gained by substituting any of them for copper sulphate.

J. J. C. Buckley.

WRIGHT, W. H., McMULLEN, D. B., FAUST, E. C. & BAUMAN, P. M. The Epidemiology of Schistosomiasis Japonica in the Philippine Islands and Japan. II. Surveys for Schistosomiasis Japonica on Mindanao, Philippine Islands. *Amer J Hyg* 1947, Mar. v 45, No. 2, 164-84, 6 figs (maps)

In the latter half of July and early August 1945 it was important to military operations to determine whether schistosomiasis caused by *S. japonicum* was endemic in the Davao area, on the east side of Mindanao. The disease had already been reported from the provinces of Surigao and Agusan, and occasional cases of infection were believed to have originated elsewhere. A survey was undertaken, examinations were made of the civilian population for hepatomegaly, hospitals were visited and their staffs were questioned in a search for suspected cases, stool examinations were made when conditions allowed, and studies of the snail population in possibly infected areas. These enquiries were made under the difficult conditions of active warfare in an area still direct to hostile Japanese interference. No evidence of the presence of the snail in the Davao area, and snail surveys failed to reveal the

presence of the local snail host, *Oncomelania quadrasi*. Nevertheless, later, schistosomiasis caused by *S. japonicum* was reported in American prisoners of war confined in Davao Penal Colony, situated some 12 kilometres further north than the survey party was able to penetrate. In the more central adjacent province of Bukidnon, 11 proven and 3 suspected cases were discovered in an evacuation hospital near Valencia, and another 12 proven and 1 suspected case among Filipinos in Valencia civilian hospital. No search for the snail hosts in two areas whence these cases probably derived was possible; an air survey, however, indicated a terrain suitable for *O. quadrasi*. There is reason to believe that in the coastal areas of Lanao, a province to the west of Bukidnon, there are endemic areas of schistosomiasis japonica; and survey of some riverine areas of this province also indicated foci of endemicity of the disease.

A. R. D. Adams.

FAUST, E. C. The Effects of Cold Temperatures on the Eggs of *Schistosoma japonicum*. *J. Parasitology*. 1947, Apr., v. 33, No. 2, 134-7.

"The known endemic regions of schistosomiasis japonica include five relatively small areas in the Japanese home islands, a vast territory in the Yangtze valley of Central China and several watersheds in South China, a small focus in Formosa, portions of the islands of Mindoro, Leyte, Samar, and Mindanao in the Philippines, and one small area in northern Celebes. In Japan

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The midsummer temperatures in these countries are all suitable for the hatching of *S. japonicum* eggs, but in China and Japan the winter temperatures are too low for hatching. The author decided to investigate the possibility that *S. japonicum* eggs may remain viable after long periods in the cold. For this purpose, specimens of stools of three dogs, containing *S. japonicum* eggs (the infection having been contracted in the Philippines), were investigated in New Orleans. The faeces were kept at $4^{\circ} \pm 1^{\circ}\text{C}$., and portions were examined at different times, to see if, after being allowed to reach $25^{\circ} \pm 4^{\circ}\text{C}$., they contained viable eggs, as judged by microscopic examination.

Two of the specimens had been sedimented, and were repeatedly washed in water before being placed in the cold; in the third specimen the eggs were enmeshed in mucus, and were kept in that state. At the beginning of the experiments, in the sedimented specimens, 55-57 per cent. of eggs were viable, and one specimen contained a few viable eggs after 6 months in the cold. No viable eggs were found in the mucus specimen after 27 days in the cold.

Eggs, therefore, may survive in the cold, and the author points out that he was working with strains from a tropical country where there is no frosty season; it is not impossible that in colder countries there may have developed strains even more resistant to cold.

Charles Wilcocks.

WRIGHT, W. H., BOZICEVICH, J., BRADY, F. J. & BAUMAN, P. M. The Diagnosis of Schistosomiasis Japonica. V. The Diagnosis of Schistosomiasis Japonica by means of Intradermal and Serological Tests. *Amer. J. Hyg.* 1947, Mar., v. 45, No. 2, 150-63. [23 refs.]

The arrival of the American Commission on Schistosomiasis in Leyte (Philippine Islands) coincided with the presence in hospital of many patients with schistosomiasis japonica. *S. japonicum* contracted in the island. These cases were often difficult, and the technique was investigated. After

reviewing the literature on this subject the authors describe how antigens for intradermal and flocculation tests were prepared from adult *Schistosoma mansoni* obtained from experimentally infected animals. The details of preparation of the various antigens are described. Attempts at diagnosis by means of the intradermal test were disappointing in early cases (4 to 5 months duration of infection) though later during the chronic stage of the disease and in

cured by chemotherapy with a series of controls were examined with a flocculation test. Of 104 persons microscopically diagnosed 87 (83.7 per cent) gave a positive flocculation test. 75 of these were members of the forces and recently infected and 58 of these gave positive readings. 29 chronic civilian cases all gave positive readings. In 11 of 70 persons suffering from a variety of conditions but presumably free from schistosomiasis non-specific positive readings were obtained and three non-specific positive readings were observed in civilians from a non-endemic area of the island. A correlation between the intensity of the reaction and the severity of the symptoms was observed all negative findings being from

sistently negative readings. In 34 chronic cases of schistosomiasis in civilians 25 gave a positive formol-gel test. 27 civilians apparently free from the disease all gave negative formol gel reactions. A. R. D. Adams

WINKENWERDER W. L. HUNNINEN A. V. HARRISON T. BILLINGS T. CARROLL D. G. & MAIER J. Studies on Schistosomiasis Japonica. 2. Analysis of 364 Cases of Acute Schistosomiasis with Report of the Results of Treatment with Fudrin in 184 Cases. *Bull. Johns Hopkins Hosp.* 1946 Dec. v. 79 No. 6 406-35 3 charts

This is a report on 364 patients (352 white U.S. troops) with schistosomiasis admitted to 118th General Hospital on Leyte Island between November 1944 and May 1945. All except two had been infected during the reoccupation of Leyte which started on October 20th 1944. Few cases were infected later than the end of December as circumstances changed and preventive precautions were taken.

Of 352 cases 30 (8.5 per cent) were classified as severe, 110 (31.2 per cent) as moderately severe, 187 (50.3 per cent) as mild and 25 (10 per cent) as asymptomatic.

The average latent period before symptoms appeared was 40 days in severe cases and 50 days in mild cases with extremes of 26 and 58. While most of the severe and moderately severe cases showed their first symptoms in December and January, in a few especially those with neurological disturbances these were delayed until March, April and May. The asymptomatic cases were picked up in surveys of units exposed to infected water or incidentally in hospital.

Ova of *Schistosoma japonicum* were found on an average about one month after symptoms appeared. In 344 (93.7 per cent of 367) the ova were mature in 16 (4.4 per cent) immature but later mature ova were found and in 7 (1.9 per cent) no ova were found at first but after treatment four showed mature or immature ova. In these the diagnosis was made on history of exposure, symptoms and eosinophilia. Eosinophilia (over 500 per cmm) was found in 322 (92 per cent of cases) it was almost constant in moderately severe cases (96.3 per cent) but less constant (76 per cent) in symptomless

cases. In 3 severe cases it was not present. The degree of eosinophilia was frequently between 10,000 and 50,000 per cmm. of blood, as high as 85 per cent. of leucocytes.

Various treatment courses were given; Fouadin, from a total of 40 ml. to 80 ml. in different groups; tartar emetic; and anthiomaline. In all groups there were relapses, but only the results of treatment with a total of 40 ml. of Fouadin is discussed here. There were 210 patients in this group. The acute cases were observed 3 weeks after the beginning of treatment. The average by the 13th day. The relapse rate was cases observed more than 4 weeks: in 4 cases, there was a second relapse. Most relapses were noted between the 7th and 10th weeks. The relapses were evidenced only by the reappearance of ova in the stools. In only 4 of 55 relapses was the return of symptoms noted. The ova showed no loss of viability after treatment had been given; this suggests that the action of the drug is on the adult worm.

The eosinophilia showed less tendency to fall in the relapsing cases; 60 per cent. fell compared with 83 per cent. in the non-relapsing cases. The tendency to relapse was correlated positively with the severity of the original infection.

By sigmoidoscopic examination, yellowish nodules were observed in the intestinal mucosa. Some were surrounded by a red zone, and a few showed superficial ulceration at the apex of the nodule. About half the relapsing cases showed these nodules, and they were found in 7 of 80 cases in which ova were not found in the stools. It was believed that they were evidence of relapse, and that they should be accepted as such and the patient treated. [There are many gaps in this report where data have been reported elsewhere: BILLINGS, WINKENWERDER & HUNNINEN, *Bull. Johns Hopkins Hosp.*, 1946, v. 78, 21; CARROLL, this *Bulletin*, 1946, v. 43, 1047; FRANK, *Amer. J. Psychiatry*, 1946, v. 102, 631.] L. E. Napier.

HOLTON, Pamela. The Biological Estimation of Substances used in treating Cestode Infestations. *Brit. J. Pharmacol.* 1947, June, v. 2, No. 2, 100-107, 3 figs. [15 refs.]

A method for the standardization of anti-cestode drugs is described. Mice with natural infections with *Hymenolepis diminuta* were taken; *H. nana* was also present. Extractum filicis, B.P. was given orally as an emulsion, followed 2 hours later by 1 cc. of 6.5 per cent. magnesium sulphate solution. Three hours later, the faeces were examined; the mice were killed and worms were collected from the several parts of the intestines. The worms were measured by their wet weight. Live worms from the small intestine were considered unaffected by the drug, while worms in the faeces, or large intestine, or motionless worms in the small intestine, were considered to be affected. The result was expressed as the percentage of worms affected (compared with total worms); if the probit of this is plotted against the logarithm of the dose a straight line relationship is observed. At least 15 mice should be used on each dose.

F. Hawking.

TORRANCE, H. W. Reminiscences and Reflections on Hydatid Disease. *J. Palestine Arab Med. Ass.* 1947, May, v. 2, No. 4 87-97. [10 refs.]

A number of useful observations on epidemiology, pathology and clinical features.

CHIFFLET, A. & LLOPART J. Equinococosis hepática y riñón derecho. [Echinococci Infection of the Liver in relation to the Right Kidney.] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1946, Nov. & Dec., v. 29, Nos. 5/6, 509-27, 6 figs.

A general discussion.

ANDREON E. & BERNILDEZ O. Quiste hidático de la región diafragmática izquierda [A Hydatid Cyst in the Left Diaphragmatic Region] *Arch. Latinoam. de Med. Ciruj. y Especialidades* 1946 Nov & Dec, v 29 Nos 56-48-98 8 figs.
Report of a case

PRIOR I A M. Hydatid Cyst of the Lung of Unusual Size. Report of a Fatal Case. *N. Z. J. Med.* 1947 Apr, v 46 No 252, 109-113 2 figs. on pls.
The cyst caused death by mechanical effect.

ARDAO H A. Quiste hidático del diafragma. Hydatid Cysts of the Diaphragm. *Arch. Latinoam. de Med. Ciruj. y Especialidades* 1946 Nov & Dec, v 29 Nos 56-49-98 5 figs.
A general discussion

ASTRUP A. Uncinari Stenoccephala as a Cause of Skin Disease in Man. *Acta Dermato-venereologica* 1945 Mar, v 25 No 3 389-92 2 figs

Uncinari stenoccephala, the hookworm of certain carnivores in temperate climates, was incriminated in a case of skin eruption in a Danish laborer. The eruption was distributed over both thighs. It consisted of a pea most of them nematode identified. A larval was found in all the samples of pus. The infection was presumed to have come from a fox terrier which was in the habit of sleeping in the patient's bed. The adult parasites could not, however, be demonstrated in this suspected animal so that the rather elaborate theory associating bed wetting with skin invasion by the hookworm larvae would seem to be somewhat supererogatory.
J J C Buckley

VIKARJI A K & BRADRI V V. The Treatment of Intestinal Worms with the Indigenous Drugs Butea, Embelia and Kamala. *Indian Med Gaz.* 1947 Feb, v 82 No 2 68-9

The indigenous Indian drugs Butea, Embelia and Kamala are reputed to possess anthelmintic properties and have been tried in the treatment of some helminth infections with doubtful success [this Bulletin 1922, v 19 250].
The present authors have employed the seeds of *Butea frondosa*, the dried fruits of *Embelia ribes* and *E. robusta* and the red glands and hairs of *Valeriana philippinensis* each ground finely and administered as a paste mixed with sugar and water.

The drugs were tested in hookworm, roundworm and tapeworm infections. Dosage varied from 8 to 30 grams for children, 40 to 45 grams for adolescents and 60 grams or more for adults. The drugs were without effect on hookworm and tapeworm.

In *ascaris* infections Butea and Embelia were effective either singly or in combination, about half of some 120 persons so treated were cured by a single dose of 60 grams or more.

It is claimed that these results indicate that Butea and Embelia are better than santonin and equally as good as oil of chenopodium in the treatment of ascariasis.

In support of this claim, reference is made to the work of the senior author, with MAPLESTONE [this *Bulletin*, 1932, v. 29, 417], who recorded only 31 cures of 90 patients with a single dose of santonin, and 37 of 67 with oil of chenopodium.

The bulk of the drugs is a disadvantage, but may be overcome to some extent by the preparation of compressed tablets. The cost of the drugs is many times less than that of santonin and oil of chenopodium.

H. J. O'D. Burke-Gaffney.

FOSHAY, L. The Cuticular Morphology of some Common Microfilariae. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 233-43, 2 pls. [13 refs.]

By means of the Saisawa-Sugawara silver staining technique, transverse striations were demonstrated in the cuticle of the microfilariae of the following species:—*W. bancrofti*, *W. malayi*, *L. loa*, *M. ozzardi*, *A. perstans*, *O. volvulus*, *D. immitis*, and *L. carinii*. The striations are spaced regularly at the same interval in all the species, varying only between 12 and 13 striations to each 11.1μ , and they are present throughout the total length of the microfilariae.

J. J. C. Buckley.

EYLES, D. E., HUNTER, G. W. & WARREN, Virginia G. The Periodicity of Microfilariae in Two Patients with Filariasis acquired in the South Pacific. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 203-9, 3 figs.

This paper concerns the microfilarial periodicity displayed in two ex-service patients with filariasis caused by *W. bancrofti*; one was infected in Bora Bora in the Society islands, the other at Tonga Tabu in the Tonga group. Microfilarial counts were made by direct examination of stained or fresh blood smears made from finger punctures, except in the first series of counts on the second patient, when Knott's concentration technique was used.

On graphs and charts with which this paper is illustrated, all counts are shown as the number of microfilariae per 100 cmm., although the individual quantities examined in the first case were 25 cmm.; in the second, the amount was as large as 1 cc.

The microfilariae, as seen in the greatest numbers during the day hours in the peripheral blood, were indistinguishable from those of the nocturnal type of *W. bancrofti*.

Peak counts (the mean for the first patient being 380, compared with 9.5 for the second) were diurnal. The results of three series of counts extending over a period of 48 hours were obtained—the first in July 1945, the second a week later, and the third in February 1946.

Examination of these graphs revealed that about 10 a.m. the number of microfilariae exceeded the mean daily count, but fell below the mean between 10 p.m. and midnight. The absolute high count occurred between 12 noon and 8 p.m., and the absolute low between 2 a.m. and 8 a.m.

These two strains of *W. bancrofti* are believed to represent infections of what is termed the non-periodic type. In view of these observations and the definite microfilarial periodicity observed, this would seem an inappropriate term, but "diurnal" would appear more descriptive. [Although this investigation represents a careful piece of work, it would seem unwise at present to change the term "non-periodic" to "diurnal."]

Compared with infections amongst Polynesians, the number of circulating microfilariae in these two American patients would appear to be small, so that definite conclusions may not be drawn. In the second case, for example, concentration methods had to be employed to demonstrate individual microfilariae, so that a possible source of error was introduced. It will be observed

[September 1947]

that at no time were microfilariae absent from the peripheral blood as occurs in the case of *Loa loa*. At the best it might be argued that a relative diurnal periodicity was observed. These observations are sufficiently suggestive to warrant their repetition in the endemic area of non periodic filariasis.

EYLES D E & MOST H. Infectivity of Pacific Island *Wuchereria bancrofti* to Mosquitoes of the United States. *Amer J Trop Med* 1947 Mar v 27 No 2 211-20.

These studies were undertaken to determine the susceptibility of United States mosquitoes to a S Pacific strain of *W. bancrofti* from a patient (an ex service man) who became infected whilst serving on Bora Bora in the Society Islands. This is one of the very few filaria infected American islands in whose blood microfilariae could be found and in addition the 2 to 8 per cmm in addition the - from true daylight.

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Development to advanced or infective stages occurred in the following American mosquitoes—*Culex pipiens*, *C. quinquefasciatus* [*C. fatigans*], *C. erraticus*, *C. salinarius*, *Anopheles walkeri*, *A. punctipennis*, *Aedes triseriatus*, *A. aegypti*, *A. atropalpus* and *Mansonia perturbans*.

In other species *A. quadrimaculatus*, *A. maculipennis freeborni*, *Aedes atlanticus* and *Psorophora ferox* infection did not progress beyond the early first larval stage.

Culex quinquefasciatus (*fatigans*) is the most consistently abundant mosquito in the southern U.S.A. but this species was less susceptible qualitatively and quantitatively than *C. pipiens* only 34.9 per cent being found infected against 83.5 per cent of the latter. In the work here reported substantial agreement with the work of BAHR (1912) was obtained and also with the investigations of NEWTON *et al* [this Bulletin 1946 v 43 52] who showed that *C. quinquefasciatus* is almost completely susceptible to the nocturnal strain of *W. bancrofti*.

P. Manson Bahr

WHARTON D R A. Further Evaluation of the Skin Test for Filariasis in Man, based on Results obtained in British Guiana. *J Infect Dis* 1947 Jan-Feb v 80 No 1 117-20.

In an earlier paper by WHARTON and STELMA [this Bulletin 1946 v 43 103-4] the conclusion was reached that a dose of 0.02 ml of a 1:100,000 dilution of *Dirofilaria immitis* antigen in saline is a suitable antigen for the diagnostic test for filariasis. These authors used also a control of dog serum as a control. The present - more highly effective - the necessity of using

The tests were done at Georgetown, British Guiana. Of these 215 persons 193 (89.8 per cent) were positive, 11 (5.1 per cent) were negative and 11 (5.1 per cent) gave indeterminate reactions. The author defines an indeterminate reaction as one which but for use of the dog serum control would be classed as a positive or in a group of control subjects as a false positive.

Of the 215 persons tested, 110 were negroes, 80 East Indians, 7 whites, 3 Chinese, 2 aborigines and 13 were "a varied mixture". Of the 110 negroes, 90 per cent. were positive, 5.5 per cent. indeterminate and 4.5 per cent. negative. Of the 80 East Indians, the corresponding figures were 90, 5 and 5. The other groups did not contain sufficiently large samples for analysis. The reactions of the negroes and East Indians were thus practically identical. Many of the patients tested were still having filarial attacks.

Analysis of the age groups showed that widespread infection is acquired at an early age. Thus, of 23 children between 3 and 10 years old, 22 were positive. The authors of the earlier paper cited above found that only 80 per cent. of the subjects tested by them reacted to this antigen at the same dilution. The fact that at least 90 per cent. of the present series of tests were positive is ascribed by the author to the fact that every day freshly diluted antigen was used. When a group of patients was tested with a 1:100,000 dilution of the antigen which has been subjected to a high temperature all the previous day and possibly also through the night, many reactions were weak or negative, whereas when the same persons were re-tested with freshly diluted antigen, most of them were positive.

Throughout the series of tests, no delayed reactions occurred and the tests showed that the antigen is highly effective and safe.

Analysis of the 5.1 per cent. of negative reactions showed that 5 were negroes, 4 East Indians, 1 a white and 1 an aboriginal; these subjects represented all age-groups and none of them had ever had a filarial attack.

Many of the patients were, or had been recently, having one or other of the sulphonamides, but these drugs did not seem to affect the results. The author does not think that the antigen used for these tests can give cross-reactions with intestinal helminths and he refers to the paper by Wharton and Stelma (*loc. cit.* above) in which further evidence in support of this view is given.

Especially interesting results were obtained with 29 patients of both sexes who had had elephantiasis, usually of the legs only, but, in a few cases of the arms also, for 2½ to over 30 years. All but five of these were between 50 and 87 years old. Two of them gave indeterminate reactions because they were hypersensitive to dog serum. Of the other 27, only one was negative. This was an infirm woman 83 years old. All but two of the 26 positives gave strong reactions. The author suggests that the tissues of elephantoid patients are highly reactive and that they wall in the mature filarial worms and also block all channels by which microfilarial larvae might escape into the blood. The absence of microfilarial larvae in the blood of such patients does not, therefore, necessarily mean that all the worms in them are dead and the presence of such walled-off worms may account for the positive skin reactions which these patients may give.

G. Lapage.

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TRAVIS, B. V. Relative Efficiency of Six Species of Mosquitoes from Guam, M.I., as Developmental Hosts for *Dirofilaria immitis*. *J. Parasitology*. 1947, Apr., v. 33, No. 2, 142-5.

SCOTT, J. A. Production of Quantitative Infections with the Filariae of the Cotton Rat. *Science*. 1947, Apr. 25, 437.

The author describes a simple method of producing quantitative infections with *Litomosoides carinii*, the filaria of the cotton rat: it is claimed that this allows for more accurate experimental determinations than those previously obtained with wild-caught or mass-infected animals, and makes other studies possible, particularly in chemotherapeutic investigations.

Liponyssus bacoti the tropical rat mites are raised on a white rat in a metal tank surrounded by a moat containing oil. An initial 50 mites will produce a large colony in 3 to 4 weeks and the white rat is then replaced by an infected cotton rat. The latter is removed in 10 days and a few days later the mites migrate up the sides of the container.

They are taken by suction into vials and kept for at least 24 hours for a first opportunity for an infected rat.

The mites are counted in saline in a counting slide designed by the author and listed by Arthur H. Thomas Company.

When sufficient larvae are obtained they are drawn into a 25-gauge dermic needle $3\frac{1}{2}$ inches long.

J. J. C. Buckley

CLOTT J. A. STEMBERIDGE V. A. & SISLEY Nina M. A Method for providing a Constant Supply of Tropical Rat Mites, *Liponyssus bacoti* infected with the Cotton Rat Filaria *Leishmanosoides carinii*. *J. Parasitology* 1947 Apr 33 No 2 138-41 1 fig.

This paper covers much of the technique for raising the mites in more technical detail.

J. J. C. Buckley

MADSEN H. Biological Observations upon *Enterobius vermicularis* (Pinworm). *Acta Path et Microb Scandinavica* 1945 22 No 4 392-7 [21 refs.]

The author's observations on the external migration of female *Enterobius vermicularis* indicate a biological rather than a mechanical cause for this phenomenon. It is due to the maturing of the eggs not to loss of the attachment function of the oesophagus brought about by the encroachment of the developing uterus. He concluded furthermore that gravid females can emerge through the anus lay a portion of their eggs and then retire inwards again. He discusses the nocturnal character of the migration and also the monthly periodicity of the emergences and with a reasoned argument disposes of the theory that the latter is due to development of eggs within the body of the host. The more technical details of the method used are given in the appendix.

J. J. C. Buckley

DEFICIENCY DISEASES

DRUMMEL G. Le syndrome Buaki. Note préliminaire l'action thérapeutique de la ventriculine [The Syndrome known as Buaki. Preliminary Note the Therapeutic Action of Ventriculin]. *Ann Soc Belge de Méd Trop* 1946 Dec 31 26 No 4 329-39.

In this paper the author records the results of treating 20 selected cases of Buaki, a syndrome characterized by hypochromotrichia and depigmentation, anaemia and oedema and apparently similar to or identical with the kwashiorkor, malignant malnutrition and infantile pellagra of other writers.

[this *Bulletin*, 1947, v. 44, 232]. Following the work of GILLMAN and GILLMAN [ibid., 118] "Ventriculin" was the main therapeutic agent and it proved rapidly effective in the majority of cases, especially with respect to oedema and anaemia. It was combined with a full hospital diet, iron and milk, and this régime is considered the best method at present available of treating this condition.

There is no record of hepatic changes in this series.

Dean A. Smith.

WATERLOW, J. C. Nutritional Liver Disease in West Indian Infants. *Proc. Roy. Soc. Med.* 1947, May, v. 40, No. 7, 347-51 (Sect. Exper. Med. & Therapeutics 9-13), 2 figs. [14 refs.]

After a preliminary examination of a small number of cases, the author describes briefly a condition which he thinks may be common among babies in the West Indies. The condition starts usually within a few months of weaning, and its main features are oedema, gross muscular wasting and fatty infiltration of the liver. Mortality has been high in the cases observed [but if the author is correct in believing that the enlargement of the liver found in 10 per cent. of an unselected group of infants represents a minor degree of this condition, then the mortality rate will be much lower]. Impairment of hepatic function was demonstrated during life by the bromsulphalein test, but not by other tests. Fatty infiltration of the liver was demonstrated by aspiration biopsy, or by examination after death.

In the small number of cases tested, no good effect was obtained by giving choline, methionine or inositol. [It is not clear whether yeast was also used without effect.] Increasing the quantity of milk in the diet to 30 oz. daily resulted in a rapid clinical improvement, with a rapid loss of oedema, a rise in serum protein, and a slow decrease in the size of the liver.

The condition as described has many resemblances to the "malignant malnutrition" of H. C. TROWELL [this *Bulletin*, 1946, v. 43, 1062] but several of the features of the latter condition are not described in the West Indian infants.

H. E. Harding.

BARNES, G. T. Preliminary Studies in Nutritional Deficiencies. *J. Trop. Med. & Hyg.* 1947, June, v. 50, No. 6, 112-19.

It has long been suspected that native dietaries in Fiji may be deficient in essential nutrients. A projected nutritional survey was postponed on account of the war, but as a preliminary investigation 4,500 hospital patients were examined for evidence of nutritional disease.

Mild degrees of deficiency of B-complex factors, evidenced by angular stomatitis and burning feet, were occasionally encountered, but clinical manifestations of major degree were not found. Urine-vitamin B₁ estimation (thiochrome method) after a test-dose of 1 mgm. suggested a lowered status in respect of this factor. [Opinion is divided on the interpretation of the results of this test and even on its validity as an index of nutritional level], but no definite cases of beriberi were seen and though oedema was common, it could rarely be attributed to hypoproteinaemia.

On the other hand, anaemia, mostly hypochromic and often very severe, was extremely common and is to be the subject of a further report.

With the reservation that the anaemia may be of nutritional origin, it is concluded that the diet is not responsible for serious impairment of health or working capacity.

Dean A. Smith.

KARL R V AITON H F PEASE E D BEAN W B HENDERSON C R.,
JOHNSON R E & RICHARDSON L M Tropical Deterioration and
Nutrition Clinical and Biochemical Observations on Troops *Medicine*
1947 Feb 1 26 No 1 1-40 3 figs [46 refs]

The belief that there is a specific deleterious effect of climate and environment upon white settlers in the tropics has been widely held for many years. The syndrome of tropical deterioration, as described by medical writers and lucidly presented by the authors, can doubt but be recognized and arises in response to similar conditions.

During early 1945 the authors working as a unit by identical methods conducted surveys on the health of troops in the tropics. The surveys included dietary investigations, medical histories and physical examinations of individuals especially with respect to nutritional status, physical fitness tests and analysis of blood and urine samples. A Canadian unit working in India and Burma studied Indian soldiers and a US unit in several Pacific islands studied US troops both white and American troops under field conditions in the tropics of 20 different localities.

up to 1000 in troops. In general, fitness and morale were better than those of garrison troops.

A high degree of correlation was demonstrated between calculated intake and urinary excretion of thiamin, riboflavin and ascorbic acid.

The nutrient intake of Indian troops was difficult to assess owing to racial and religious differences. It appeared that their intakes of animal protein, riboflavin and ascorbic acid were lower than those of US troops and they were found to have lower values for haemoglobin, serum protein, serum ascorbic acid, urinary ascorbic acid and urinary riboflavin. But no cases of deficiency syndromes were seen and fitness and efficiency were good, a regiment of Gurkhas recording the highest physical fitness test scores of any troops.

In a general discussion the authors emphasize the importance of variety and palatability of food items and the

avoidance of caloric deficits, and offer no support to the proponents of supplementary vitamin administration or restricted animal protein intake.

Dean A. Smith.

DENNY-BROWN, D. Neurological Conditions resulting from Prolonged and Severe Dietary Restriction. (Case Reports In Prisoners-of-War, and General Review.) *Medicine*. 1947, Feb., v. 26, No. 1, 41-113, 12 figs. [288 refs.]

"The confinement of large groups of men in close captivity in war prison camps, on extremely limited diets for long periods of time, has unwittingly provided data on the effect of dietary insufficiency, on a scale that experimental medicine can hardly hope to emulate." Among the deficiency diseases observed in the camps and amongst ex-prisoners of war from the Far East were a variety of nervous disorders of which both the mechanism of causation and clinical classification are in doubt. The author, as Consultant in Neurology to India Command and Allied Land Forces South-East Asia, examined and investigated all those who suffered any neurological disability from among nearly 4,000 recently released prisoners, studied camp records and talked with camp medical officers, the present paper embodies his experiences and conclusions.

The first section of the paper is devoted to clinical descriptions of the main neurological syndromes, their onset and course.

Beriberi.—In 110 patients, the presence of symmetrical foot-drop with muscular wasting below the knee, tenderness of calf muscles, stocking area of hypesthesia and loss of ankle jerks, clearly indicated a distal type of peripheral neuritis. It was noticed that weakness in dorsiflexion, muscular tenderness and absence of ankle-jerk persist for a long time in those who are recovering and it is suggested that these three signs may be insisted upon as essential criteria for diagnosis.

Retrobulbar neuritis.—A large number of ex-prisoners gave histories suggestive of their having recovered from retrobulbar neuritis; residual disability was found in 185 cases. The constant complaint was of misting and loss of central vision, both eyes being affected. No cases of complete blindness were seen, all patients being able to count fingers in the peripheral field. Examination revealed a central scotoma, and temporal pallor of the disc in all but the mildest cases. Many showed also an area of pigmentation adjacent to the temporal margin of the disc: no other fundal abnormalities were seen.

Spinal ataxia.—Though there were a few very mild and a few very severe cases of this condition, the majority showed an unsteady, wide-based gait with staggering on turning, and Rombergism. The constant finding was loss of vibration and position sense in the lower limbs with impairment of touch and pain sensation. Muscle power and bulk appeared unaffected and reflexes were variable. These ataxic patients, 60 in number, were all afebrile and not significantly anaemic: the majority had retrobulbar neuritis but this association was not invariable.

The Spastic Syndrome.—Nine British patients were clearly distinguished from the ataxic cases by a stiff gait in which the legs tended to cross in adduction. There were extreme spasticity, exaggerated reflexes, patellar and ankle clonus and extensor plantar responses. The condition bears a close resemblance to, if not identity with, lathyrism.

In addition, *central deafness* and *laryngeal paralysis* were observed in a relatively small number of cases; there were a number of intermediate, combined or transitional conditions, and a history of "burning feet" was obtained in many.

The good diet upon release brought about rapid improvement in those suffering from beri beri the other neurological conditions showed little response to treatment. Some limited improvement followed injections of crude liver extract in cases of retrobulbar neuritis and spinal ataxia.

In a second section the author gives an historical survey of nutritional disease as it affects the nervous system and a general review of the literature on the subject. It is impossible to make a useful abstract of this section in it a vast volume of observation and record is lucidly condensed into a small compass. It is supported by a comprehensive and well selected bibliography.

[In the present series of cases, all subjects were between 43 and 49 years of age. This is at variance with

43 [159] and Smith [ibid] burning feet without corneal changes observed the converse.]

causation of these nutritional diseases in B-complex factors (again using the word causation of pellagra on a

maize diet and in the causation of beriberi as in as lathyrism. The author concludes. The disorders are highly specific in the localization of effect to different parts of the nervous system and indicate the presence of correspondingly specific but unknown processes of abnormal metabolism. The manner in which the nervous system is damaged is reminiscent of the subacute combined degeneration of pernicious anaemia but the accentuation was different and the anaemia absent. Detailed neuropathological studies are badly needed.

There is as yet no indication for the use of any of the pure vitamin substances in the treatment of any of these affections. [Since this paper went to the use of calcium pantothenate in 46 v 43 768.] Crude extracts of

yeast and liver have given good results in mild or early cases and as a source of both known and undefined factors in the vitamin B complex are the therapeutic agents of choice.

A balanced protein intake is as necessary as a vitamin supplement. The provision of fresh vegetables in the diet would appear of first importance as a prophylactic measure.

(This valuable paper should be read in its entirety by all who are interested in the neurological effects of dietary restriction.) Dean A. Smith

HARIDAS G. Infantile Beri-Beri in Singapore during the Latter Part of the Japanese Occupation. *Arch Dis in Childhood* 1947 Mar v 22 No 109 23-33 2 figs (1 on pl) [18 refs]

In 1940-1945 139 cases of infantile beriberi were admitted

in B₁ in doses of not less than 10 mg be instituted early enough

The author draws no distinction between infantile beriberi and "breast-milk intoxication" and concludes that the two conditions, if not identical, are both caused by vitamin B₁ deficiency. [This conclusion differs from that of FEHLY [this *Bulletin*, 1945, v. 42, 139] who, on the basis of a series of clinically similar cases, suggests that the condition is caused not by primary vitamin B₁ deficiency, but by the toxic action of such intermediary metabolites as methylglyoxal which are present in the milk of beriberic mothers. Decision between the two views is not at present possible. In either case, it is of the first importance, as both writers emphasize, that the disease can be eliminated by the prevention or early treatment of beriberi in pregnant or lactating women.]

Dean A. Smith.

SPRUE.

SPIES, T. D., LOPEZ, G. G., MILANES, F. & ARAMBURU, T. Synthetic Folic Acid. The Effectiveness of a Conjugated Form in the Treatment of Tropical Sprue, Addisonian Pernicious Anemia and Nutritional Macrocytic Anemia. *J. Amer. Med. Ass.* 1947, May 3, v. 134, No. 1, 18-20.

The following five substances have been isolated in crystalline form: (1) vitamin Bc; (2) *Lactobacillus casei* factor from liver; (3) *L. casei* factor from yeast; (4) another *L. casei* factor isolated from a fermentation residue; and (5) vitamin Bc conjugate.

Vitamin Bc and the factors from liver and yeast are identical with the synthetic product known as pteroylglutamic acid, containing one molecule of glutamic acid; but the special *L. casei* factor isolated from the fermentation residue yields three molecules of glutamic acid, and the vitamin Bc conjugate yields seven molecules. These substances can be designated pteroyldiglutamyl-glutamic acid and pteroylhexaglutamyl-glutamic acid respectively.

The present report deals with the synthetic analogue of the former in the treatment of tropical sprue, Addisonian pernicious anaemia and nutritional macrocytic anaemia in relapse. The response to treatment is illustrated by a case history of sprue in a Cuban man aged 55 who had relapsed after treatment with liver extract and blood transfusions. From the 60th hospital day he was given, intramuscularly, 10 mgm. of synthetic pteroyldiglutamyl-glutamic acid daily for eight days. On the fifth day of treatment, the reticulocyte count began to rise, reaching a peak of 14.8 per cent. ten days after the initiation of therapy. Clinical improvement paralleled the haemopoietic response.

A similar response followed the administration of this synthetic product in two other patients, one with Addisonian pernicious anaemia, the other with nutritional macrocytic anaemia. This substance differs chemically from folic acid (*L. casei* factor) in that it has two more molecules of glutamic acid and is not excreted so promptly in the urine of subjects with macrocytic anaemia as is the *L. casei* factor.

The impression is gained that, proportionately, the response to synthetic *L. casei* factor is greater than to the conjugated form, but much of folic acid under natural conditions occurs in the latter form, and it has been shown that many patients with macrocytic anaemia are unable to convert vitamin Bc (a conjugated form) to free folic acid.

P. Manson-Buhr.

VENOMS AND ANTIVENENES

SERGEANT Et A propos de la vipère ammodyte [The Viper *ammodytes*] *Arch Inst Pasteur d'Algérie* 1947 Mar v 25 No 1 71-6 6 figs [Refs in footnotes]

SARKAR N K & MAITRA S R Effect of Ultra-Violet Rays on the Stability of Cobra-Venom and Cardiotoxin *Ann Biochem & Exper Med* 1946 v 6 No 3 87-8

Toxicity appeared to be greatly reduced by irradiation

SARKAR N K MAITRA S R & ROY P K Effect of Methylene Blue on the Toxicity of Cobra Venom *Ann Biochem & Exper Med* 1946 v 6 No 3 85-6

Methylene blue was not found to neutralize toxicity

HENRI DUSTIN Marie Jeanne Action antagoniste du glutathion sur les propriétés hémolytiques du venin de cobra [Antagonistic Action of Glutathione on the Haemolytic Properties of Cobra Venom] *Acta Biol Belgica* 1941 v 1 No 2 292-3

Glutathione in a 4 per cent solution completely suppressed the diminished red cell resistance in animals exposed to haemolyzing doses of cobra venom

ANILJA M L BROOKS A G VEERARAGHAVAN N & MENON J G K A Note on the Action of Heparin on Russell's Viper Venom *Indian J Med Res* 1946 Oct v 34 No 2 317-22

Both *in vitro* and with *in vivo* experiments in rabbits heparin was found to be effective in counteracting the effects of Russell's viper venom

CILLI V & CORAZZI G Ricerche sul veleno di alcuni scorpioni eritrei (*Parabuthus liosoma abyssinicus* e *Pandinus magretti*) e sulla preparazione di un antisiero specifico [Venoms of Eritrean Scorpions, *Parabuthus liosoma abyssinicus* and *Pandinus magretti* Preparation of Specific Antivenenes] *Bol Soc Ital di Med e Igiene Trop (Sez Eritrea)* 1946 v 6 No 6 397-406 English summary

Eritrean scorpions belong to the genera *Buthus*, *Parabuthus* and *Pandinus*. The authors' experiments have been carried out with *Parabuthus liosoma abyssinicus* and *Pandinus magretti* and he has studied their actions in mice, rats and guinea-pigs. The venoms were obtained by E. Sergeant's method of grinding telsons in saline, centrifuging and adding glycerol. The m.l.d. of the former (*P. abyssinicus*) for mice of 25 gm weight was 0.4-0.6 cc (i.e. 4/10-6/10 of a telson) of *P. magretti* 1.0 cc (one whole telson). Death was preceded by staring coat excitation and dyspnoea followed by paralysis of the limbs. Post mortem there was haemorrhagic oedema gelatinous in character at the

Antivenenes were prepared by injecting donkeys with increasing doses of the venom, but this animal did not prove very satisfactory; better results were obtained from the horse, but even with this the *in vitro* neutralizing potency did not go *pari passu* with *in vivo* protective action. *H. Harold Scott.*

GAJARDO-TOBAR, R. & VILDOSOLA, E. Anotaciones acerca del tratamiento del Latroductismo. Los seis primeros casos curados con suero anti-latroductus. [The First Six Cases of *Latroductus mactans* Blte treated by Antivenene.] Reprinted from *Rev. Soc. Argentina Biol.* 1944, Apr., v. 20, No. 1, 12-20.

The symptoms arising from bites by the Black Widow spider, *Latroductus mactans*, are very severe and always serious. [A detailed account is to be found in this *Bulletin*, 1936, v. 33, 401, of a man who volunteered to be bitten on the finger in order that the symptoms and their course might be observed and studied.] Though recovery takes place without treatment, or with symptomatic treatment only, this usually takes up to a week.

Six cases are described in this paper; the ages of the patients ranged from 13 to 40 years and the symptoms were typical in each case. Treatment with an antivenene obtained from the Carlos Malbrán Bacteriological Institute, Buenos Aires, was followed by excellent, even dramatic, results. 5.0 cc. of the antivenene was injected intramuscularly and within an hour the pain was relieved, the patient slept, recovery was complete in a few hours and the patient able to leave hospital in a couple of days or less. In one instance, 24 hours had elapsed before the antivenene was injected; in the meantime the usual symptomatic remedies had been tried, with little if any relief.

H. Harold Scott.

DERMATOLOGY AND FUNGUS DISEASES.

GONÇALVES, A. P. Resultados da inoculação do *Treponema caraleum* em boubáticos. [Results of Inoculation of the Spirochaeta of Pinta into Yaws Patients.] *Hospital.* Rio de Janeiro. 1947, Jan., v. 31, No. 1, 83-8; 91-3, 3 figs. English summary.

This is an interesting contribution indicating a certain degree of reciprocal immunity to infection by the three diseases syphilis, yaws and pinta. LEÓN Y BLANCO has recorded that *mal del pinto* develops slowly in syphilitic patients, says the author [León y Blanco has written several papers on the interrelation between pinta and syphilis; see this *Bulletin*, 1941, v. 38, pp. 89 *et seq.*], and Dr. Gonçalves has made the experiment of inoculating yaws patients with pinta spirochaetes. Both yaws and pinta are far from common in Rio de Janeiro, but he was able to find nine cases of the former for his experiment, five in an active state with skin lesions. All were Wassermann positive. Inoculations were made intradermally with lymph from patients with pinta lesions. In two of the nine, pinta lesions were observed; in one, 32 days after the inoculation and in the other three days later. When *mal del pinto* is inoculated into healthy persons, the incubation period before the primary lesion appears is usually 20 days. The result of the author's experiment points, therefore, to delay arising from the pre-existence of yaws in the two cases in which the inoculation succeeded, and to resistance to infection in the other seven which did not develop any pinta lesion. Not only was the primary lesion late in appearing, but the disease ran a slower course of evolution.

H. Harold Scott.

- OLSON B J BELL J A & EMMONS C W Studies on Histoplasmosis in a Rural Community *Amer J Pub Health* 1947 Apr v 37 No 4 441-9
2 maps & 1 chart [17 refs]
- PALMER [*Bulletin of Hygiene* 1945 v 20 613 1946 v 21 665] and C. and PETERSON [*ibid* 1946 v 21 236 742] on the distribution of persons related to

population of 20 000 of whom 16 000 are whites where two cases of histoplasmosis in children (brothers) had been reported in 1945. Local physicians co-operated in the work and persons presenting signs or symptoms consistent with histoplasmosis were sent to hospitals for mycological and radiological examinations. Search was made for infection in domestic and wild animals especially rodents which were trapped for examination. In this part of the work a game warden veterinary surgeons and private persons assisted. Two dogs on a farm the sire and one of a litter of pups had previously been found infected with histoplasmosis and 603 animals belonging to 11 species collected in the neighbourhood of the farm were examined. One dog belonging to the same litter as the infected pup and a mouse trapped in the farmhouse were found infected. From the neighbourhood of the two human cases 273 animals belonging to 7 species. No evidence of histoplasmosis was found in other areas the

human cases. Skin test and X ray. Of 476 white people examined by and 41 per cent had calcified pulmonary lesions but no direct association was established between dermal sensitivity to histoplasmin and pulmonary calcification.

On applying a second histoplasmin test after an interval of 3 to 8 months it was found that 7 per cent of 58 people who were formerly histoplasmin positive had become histoplasmin negative and 55 per cent of 40 histoplasmin negative subjects had become histoplasmin positive.

To date no evidence of mild human histoplasmosis has been found in Loudoun County Va. J T Duncan

- GAST GALVIS A Histoplasmosis en Colombia [*Histoplasmosis in Colombia*] Reprinted from *An Soc Biol Bogota* 1947 Feb v 2 No 5 203 7
1 pl [Summary in English by the author]

A fatal case of human histoplasmosis was found in the Municipality of Cucuta Department of North Santander. It was a woman 56 years old who died after seven days illness at the Charity Hospital. This is the first case which has been reported in Colombia.

- SAGHER F The Laboratory Aspect of Fungous Diseases of the Skin and Hair *Acta Med Orientalia* 1947 Mar v 6 No 3 68-78 6 figs [37 refs]

A high percentage of those attending dermatological clinics in Palestine suffer from dermatomycoses. In order to ascertain the species of fungi implicated cultures were made from 1 224 cases of suspected dermatomycoses examined at the Outpatient Clinic of the Rothschild Hadassah University Hospital Jerusalem during 1939-46. The results of this survey are tabulated.

and discussed according as the hair or skin was primarily involved, and the incidence of the fungi is compared with that recorded for other parts of the world.

Tinea capitis was the disease most frequently recorded, and in 85.2 per cent. of the cases, the causal agent was *Trichophyton violaceum*. Nearly all those so affected were Jews. The incidence of favus (caused by *Achorion* [*T.*] *schoenleini*), on the other hand, was high among Arabs and immigrants from neighbouring countries, but low among Jews. *Microsporon audouinii*, which occurs so commonly in central and western Europe and in north America, was isolated only once.

Two forms of *tinea cruris* were recognized: a localized type caused by *Epidermophyton* or *T. purpureum*; manifestation caus

SEGRETAINE, G. Sur un *Trichophyton rubrum* d'origine africaine. [*Trichophyton rubrum* of African Origin.] *Ann. Inst. Pasteur.* 1947, Apr., v. 73, No. 4, 395-7, 2 figs.

Report of a case.

RAUBITSCHKE, F. The Problems of Moniliasis. *Acta Med. Orientalia.* 1947, Mar., v. 6, No. 3, 85-90, 2 figs. [11 refs.]

After a general discussion of moniliasis, the author reviews 460 cases of cutaneous moniliasis from the Jerusalem area, in which a study was made of the causal, or associated, yeast-like organisms. *Candida albicans* was isolated most frequently. It was obtained from 91 cases, principally of interdigital erosion and paronychia. G. C. Ainsworth.

BOASE, A. J. Rhinosporidiosis. *East African Med. J.* 1947, May, v. 24, No. 5, 199.

Report of a case in an African woman, in which the conjunctiva was involved.

MISCELLANEOUS DISEASES.

DICK, G. W. A. Aortic Size in East African Natives. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 52-4.

"1. The circumference of the thoracic aorta of East African natives is significantly smaller than the standard measurements of aortic circumference in Europeans

"2. The persistent thymus found at autopsy in many East African natives may be related to a hypoplastic vascular system."

MANCEAUX, A., BARDENAT, C. & SUSINI, R. Sur quelques aspects des manifestations hystériques chez l'indigène Nord-Africain en particulier en milieu militaire. [Some Aspects of Hysterical Manifestations among North African Natives in particular in a Military Setting.] *Algérie Méd.* 1946, July-Aug., No. 4, 321-9.

Hysteria was seen among North African natives during the recent war, as a classic histrionic disorder affecting bodily rather than mental functions. Major

sonian attacks. Sensory symptoms rarely existed without motor disorders but anaesthesia various pains blindness deafness and aphonia were encountered. The exaggerated theatrical behaviour made for ready diagnosis from organic disorders.

Isolated psychological symptoms were rarely found but apathy false confusion and even hallucinatory psychosis were seen superimposed upon anaesthesia.

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an educated native could not accept. The peasant mind is fatalistic. Prejudice superstition and anthropomorphic religion credulity and suggestibility give the predilection for somatic hysterical incidents. Barrack epidemics of hysteria.

of the abstract nature of the conflict he deals with it by hysteria. This allows him to amputate the conflict together with part of his personality and to preserve his tranquillity.

Diagnosis—The difference between hysteria and malingering is one of sincerity. The natives do not have the same moral judgment upon lying or duplicity as do westerners and when they are unmasked in fraudulence one cannot expect the same emotions. In the Service it was necessary to suspect

attitude

Treatment—There were many surprises from miraculous recovery to complete failure. Persuasion alone was rarely enough and it was always necessary to fall back on physical measures. The many methods of treatment used were varied and ingenious. The less disagreeable methods did not always produce the best results and a heavy boot might have greater effect than more complex treatment. The most useful treatments were isolation diet with laxatives bed Cardiazol in sub convulsive doses electric shock treatment. local high tension shock gave the same results as did Faradism in the previous war.

Each treatment should be thoroughly tried and every case is an individual affair. There is no universally applicable method for any one clinical manifestation.

Results—The prognosis is best in paroxysmal difficulties in special sense
prognosis
The irre
indifferent
to external aggression T F Mann

MCDOWELL, F. & VARNEY, P. L. Melioidosis. Report of First Case from the Western Hemisphere. *J. Amer. Med. Ass.* 1947, May 24, v. 134, No. 4, 361-2, 1 fig.

This is an account of a case of melioidosis from St. Louis, the first to be recorded from the Western Hemisphere. The patient, a white man aged 31, had a history of an injury to his coccygeal region. The swelling which appeared was incised and shortly afterwards an acute febrile illness developed and lasted for about six weeks. The patient was treated in hospitals and right buttock a

organisms were isolated from the sinuses, the authors made a diagnosis of melioidosis by isolation of *Pf. whitmorei*. The source of infection was quite obscure. The patient had spent his life in the United States except for two years in the Panama Canal Zone 10 years before the onset of illness.

In addition to surgical measures, treatment had included local application of most of the known antiseptics, and systemic exhibition of various sulphonamides, including sulphadiazine, and large doses of penicillin. These produced no obvious benefit, and the sulphonamides were not tolerated for more than three weeks at a time. Streptomycin (16 million units in 9 days) was without effect. The patient left hospital after extensive excision of the area, followed by skin-grafting, but the authors did not feel that cure had been complete.

[It is astonishing that this rare disease should occur in one so unfortunate as to have a medical history which included all the infectious diseases of childhood, poliomyelitis, cerebrospinal meningitis, typhoid fever and trachoma.]

J. C. Cruickshank.

WILSON, H. T. H. Tropical Eosinophilia in East Africa. *Brit. Med. J.* 1947, June 7, 801-4. [17 refs.]

The tropical eosinophilia syndrome has been recorded on numerous occasions from India and other places [this *Bulletin*, 1945, v. 42, 589, 590; 1946, v. 43, 66, 252, 860; 1947, v. 44, 621, 753]. The author reviews the literature and distribution of this syndrome and refers to the scanty records of its existence in Africa. He then refers to seven cases in his own experience in Dar es Salaam, East Africa, six of which were encountered in a consecutive series of 34 patients suffering from chronic cough and asthma: of these, 29 were Indian, 4 Africans and one was an Arab; all had lived on the Tanganyika coast for 2 years, and in East Africa continuously for 8 years.

The clinical, radiological and pathological findings, for the most part, followed those reported by other workers, and included some mottling of the lung fields in three cases. Leucocytosis was constant, varying from 11,000 to 34,000 cells per cmm., and the eosinophilia varied from 52 to 78 per cent. In five specimens of sputum examined by concentration methods, mites were found in three: in two of these, the mites were identified as *Tyroglyphus*.

Treatment is discussed in detail and it is shown that treatment with inorganic arsenic was dramatically successful; the best results were obtained with a 10-day course of carbarsone followed by four weekly injections of neoarsphenamine (0.6-0.75 gm.): this produced complete clinical cure and a rapid fall in eosinophiles during the first four or five weeks; further treatment appeared to delay, rather than to accelerate the haematological response, so far as the eosinophile percentages were concerned. Six patients were cured, without relapses, in the three months follow-up period: the seventh regressed spontaneously.

Very detailed case-histories of all seven patients are given: the aetiology of the disease is fully and clearly discussed, and its possible relation to asthma.

asthma

Most cases recorded in the literature have been found in hot and humid atmospheres. It is significant that these cases occurred in Dar es Salaam, which possesses a mean temperature of 74° to 82°F and a relative humidity of 60 to 90 per cent.

The author rightly suggests that the condition may be relatively common on the coast of Tanganyika and probably elsewhere in tropical Africa.

[This is an admirable account of a careful study of this perplexing syndrome. The present reviewer who had some personal contact with the author's investigations, examined the blood of two other patients in Dar es Salaam, both Indians, who showed features and results similar to those recorded by the author. Attention to both was drawn by the eosinophilia encountered in the course of

of the clinical features to which they may be related.]

H J O D Burke Gaffney

MENON, I G K. Intestinal Fusio-Spirochaetosis simulating Cholera. [Correspondence] *Brit Med J* 1947 June 28 948

the 12th day after admission

The patient had had recurrent attacks of diarrhoea for two years before this more severe attack occurred. He had no recurrences up to eight months after the one under review.

H J O D Burke Gaffney.

GAJARDO TOBAR R & HONORATO A. Anotaciones acerca de una epidemia de miiasis humana (Estío de 1946). [Observations on an Epidemic of Myiasis in Human Belongs] *Hospital de la Sra del Mar Chile* 1947 Jan, v 3, No 1, 5-14, 1 fig. [24 refs.] English summary (4 lines).

An account of 81 cases. 46 occurred in the nose and 14 in the eyes. *Cochliomyia hominivorax* predominated.

GENERAL ENTOMOLOGY.

PRINGLE, G. & SINGH, H. A Report on the Successful Control of *Culex* Breeding in Sullage Waters by DDT Emulsion. *J. Malaria Inst. of India*, 1946, Dec., v. 6, No. 4, 393-402, 1 map & 1 pl.

Scum on the surface of water often prevents the spread of oil solutions of DDT. The authors experimented with DDT emulsions in scum-covered channels near Jubbulpore. After preliminary trials they diluted a "25 per cent. DDT emulsion concentrate" [of unstated composition] with an equal quantity of clean water. This was then pumped under the water surface of the channel to be treated, by immersion of the nozzle of a knapsack sprayer. Records of successful results up to a distance of 2,200 yards from the point of application are given, but the effective distance and dose depended on the breadth and rate of flow of the channel. Ideal conditions are found in channels in which the water flows at about two miles per day, in one of which a single application of 5 litres of 25 per cent. DDT concentrate killed larvae for one and a half miles. The general principles governing dosage are discussed and the authors conclude that the method is a promising one for prevention of mosquito breeding in sullage water. [The reviewer agrees.]

G. Macdonald.

THEODOR, O. On some Sandflies (*Phlebotomus*) of the *sergenti* Group in Palestine. *Bull. Entom. Res.* 1947, May, v. 38, Pt. 1, 91-8, 4 figs. [16 refs.]

After some brief comments on the distribution of *Phlebotomus sergenti* in Palestine, Syria and Irak and its relation to oriental sore, the author then describes the male and female of a new species *P. maris-mortui*, the male of a new species *P. jacusieli* and the male of *P. palestinensis*; some additional morphological details of the female of the last-named species are also given.

H. S. Leeson.

AGRICULTURAL RESEARCH COUNCIL. Colonial Insecticide Research, Entebbe. Progress Report No. 2 [SYMES, C. B., Entomologist-in-Charge]. 5+91 mimeographed pp., 3 maps. 1947. London: Inter-Departmental Insecticide Committees, Agricultural Research Council, 6a Dean's Yard.

The first progress report, dated April 1946, was summarized in this *Bulletin*, 1947, v. 44, 367. The work is still in progress and it is therefore necessary to point out that owing to the incomplete nature of the investigations, the conclusions reached may not be final; in fact some parts of the report are at the moment merely records and nothing else. Wherever in these first-two reports, 5 per cent. Gammexane D929 solutions are mentioned, the gamma content should read "0.76 per cent. to 0.77 per cent." and not as printed.

Observations on the effect of DDT on tsetse (*Glossina palpalis*) populations were made on Mbirubuziba island [location not stated] using 5 per cent. DDT in a mixture of kerosene and cotton-seed oil sprayed at 16-, 11- and 15-day intervals on vegetation at selected areas of fly concentration. A comparison of the density and patrol catches before and after the treatment showed an apparent reduction of fly of about 97 per cent. over a period of about 11 weeks. Further weekly routine searches for 8 weeks failed to produce a fly, and an exhaustive search is now in progress. Laboratory tests of treated vegetation

[September, 1947]

showed a decrease in toxicity, in some cases, from 100 per cent to 5 per cent in 35 days

On Nkumba peninsula a few miles east of Entebbe, a 5 per cent DDT emulsion in diesel oil at intervals over 9 weeks was about 90 per cent effective. Two calves sprayed with cotton seed oil and with 5 per cent DDT in diesel oil showed no other signs of ill effect.

At Kasenji, Uganda, an experiment was planned to observe the effects of these insecticides on mosquitoes and malaria after treatment of the internal surfaces of African huts. Six districts were treated and one was left untreated. Descriptions are given of the areas and the various types of huts and figures are presented showing the spleen rates, parasite rates and anopheline infectivity rates, but no attempt has yet been made to conduct an exhaustive survey. Anopheles and culicines are present to varying degrees, but the species occurring in greatest numbers are *Anopheles gambiae* and *funestus*, and *Taeniorhynchus africanus* and *fuscipennis*. The details of the spraying procedure are described separately for each district. The surfaces of the huts treated were the walls only, the inner surfaces of the roofs only or all the interior surfaces. The insecticides used were 5 per cent DDT in diesel oil, 5 per cent DDT in kerosene and cotton seed oil, 5 per cent Gammexane in diesel oil and 5 per cent Gammexane dispersible powder in water.

Comparison of the weekly average numbers of total and vector species of mosquitoes and the parasite rates before and after treatment showed a reduction in the numbers both of total mosquitoes and of vector species. A seasonal rise in the numbers of mosquitoes occurred in May to August, but this was not observed in the treated areas. The reduction in the numbers of mosquitoes and the parasite rates was more marked on the treated surfaces than on the untreated surfaces. The Gammexane was more effective than DDT on the malaria rat and the Gammexane was more effective than DDT on the Gammexane. Several aspects of the work are to be more fully investigated. Incidentally the Africans are pleased with the effects on the mosquitoes and on bedbugs, flies and other insects, and the people living in the huts are more eager for similar facilities. Further work is to be more fully investigated.

by side are vegetable matter. Considerable absorption of insecticide occurs on all these substances rather than on vegetation. There is less loss of insecticide when dispersible powders are used, and more experiments with these powders are planned. Other matters being studied are the effectiveness of DDT on beetles, flies, infesting hives and the possible use of dieldrin, cinnamate and tsetse repellents.

PIÉDROLA GIL, Gonzalo. Nuevos insecticidas y ahuyentadores. Su estudio, importancia y técnicas de empleo. [New Insecticides and Repellents.] Prólogo del Dr. Valentin MATILLA GOMEZ. Publicaciones del Instituto Español de Medicina Colonial. 247 pp., 35 figs. & 6 graphs. 1947. Madrid. Cosano, Imp.

This is an account of recent work on insecticides, for which the author has had recourse to a large body of published work.

In Chapter 1 he discusses DDT and Gammexane, their derivatives, and other recently discovered compounds, in Chapter 2 the physio-pathology of intoxication of insects; and in Chapter 3 the toxicity of the compounds for man, and methods of use. The techniques for evaluation of activity are described in Chapter 4. Repellents are dealt with in Chapter 5.

The value of these compounds in the prevention of infective and parasitic diseases, and in agriculture, are discussed in Chapters 6 and 7.

The book will be useful to those who desire a conspectus of work on insecticides in the Spanish language.

Charles Wilcocks.

GORDON, I. Improved Guns for the Delivery of Liquid D.D.T. Spray and Powder by Mechanical Compressors. *J. Hygiene*. 1947, May, v. 45, No. 2, 173-5, 5 figs.

STEWART, J. S. Action of Gammexane on Arthropods of Medical and Veterinary Importance. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, May, v. 40, No. 5, 559-65. [16 refs.]

This short note summarizes experimental results with the insecticide Gammexane (*gamma* isomer of hexachlorocyclohexane). Thus:—

Diptera. Dilutions of 1 in 4 million to 8 million are lethal in a few hours to aquatic larvae (Ceratopogonidae, Simuliidae, Culicidae). Larvae of *Cyclorhapha* are more resistant but the adults are very susceptible. (*Stomoxys* was controlled for three weeks by 40 mgm./sq. ft. on walls.)

Melophagus is controlled by dipping sheep in 1 : 25,000 dilution.

Anoplura and Siphonaptera are killed by dilutions of 1 : 10,000 [? applied in a dip].

Hemiptera. The lethal action is ten times as great as DDT [but persistence is not stated].

Results with Acarina:—

Argasidae. *Argas* and *Ornithodoros* were eradicated by spraying barracks with 150 mgm. per sq. ft.

Ixodidae. *Boophilus* was controlled by a 1 : 1,700 dilution.

Gamasidae. *Dermanyssus* was almost completely eradicated from hen

immersion for half a minute in 0.01 per

LABORATORY PROCEDURES

WATSON J M A Modification of the Zinc Sulphate Centrifugal Flotation Technique for the Concentration of Helminth Ova and Protozoan Cysts in Faeces *Ann Trop Med & Parasit* 1947 May; 41 No 1 43-5

The author describes two modifications of the Faust flotation technique

In the first place sieving of the faecal sample is omitted not only is the advantage of sieving negligible compared with the labour and time involved but there is evidence that any form of straining may reduce the number of ova detected

Secondly the disadvantages of requiring special fittings to hold the receiving

because of the sticky film combined with the centrifugal force developed An ordinary No 1 cover slip suffices but care must be taken to see that it is centrally placed over the centrifuge-tube before spinning is begun

This modification has the further advantages that cysts and ova tend to stick to the albuminous layer on the cover slip and that this film forms a seal between the cover slip and the tube thus preventing the leakage of fluid and access of air

The complete modified method as used by the author is briefly the following —

1 The small faecal sample about the size of a pea is broken up into a fine

3 Zinc sulphate solution (33 per cent $ZnSO_4 \cdot 7H_2O$ specific gravity 1.18) is poured into the tube and the sediment re-suspended more solution is added until the meniscus is level with the top of the tube

4 A chemically-clean circular cover slip of slightly greater diameter than the tube is lightly smeared with Mayer's egg albumin and this surface is pressed symmetrically on top of the centrifuge tube the development of air bubbles should be avoided

5 The suspension is centrifuged for 3 minutes at 1500 r.p.m. the cover slip is rapidly removed and placed face downward on a drop of Weigert's iodine on a slide

[The many advantages described in this modification indicate that it might well be adopted as a standard routine method] H J O D Burke-Gaffney

HOOD Marion The Practical Handling of Parasitology by the Clinical Pathologist *South African Med J* 1947 June; 40 No 6 523-8

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

SOUTH AFRICA UNION OF Annual Report of the Department of Public Health for Year ended 30th June 1946 GALE G W [Secretary for Health] 55 pp 1 folding chart & 1 folding map 1947 Pretoria Govt Printer

Though this report is presented by Dr Gale during the period which it covers Dr Peter ALLAN was still Secretary for Public Health as he did not

retire until 1st July, 1946. The report starts with an appreciation of all that Dr. Allan had done in budding up the Department and especially his activities regarding tuberculosis in his earlier years of office.

Vital statistics need not be entered into in detail here. The European population has increased by 35,000 and there has been improvement all round; the birth rate has risen from 25.94 to 26.23 per mille and the death rate has fallen from 9.53 to 9.33, the infant mortality rate has fallen from 45.60 per thousand live births to 42.53, the lowest on record and less than half that of a quarter of a century ago (90.07) when returns were first kept; and the maternal mortality has dropped to 2.20 per thousand live births registered, 0.65 below that of the previous year and again the lowest on record.

Notifications of epidemic diseases show a most satisfactory decline. A few figures may be given (the bracketed figures being those of the previous year): *Smallpox* 1,721 (3,317), *typhus* 778 (2,909); *plague* 4 (39), the lowest for more than 20 years, *diphtheria* 2,738 (3,046) with 184 (245) deaths; *infantile paralysis* 216 (1,380). *Enteric fever* mars the picture with a total of 6,032 (3,470), an increase of 73 per cent. *Tuberculosis*, ascribed largely to under-nourishment and overcrowding, is still a major problem and is thought accountable for some 20,000 deaths annually. Development of new industries led to influx of natives, but as no additional accommodation was provided, overcrowding of existing dwellings was the natural sequel. The returns are presented in much detail; cases and deaths are shown for each decade, in a table in which subdivisions are made according to race.

The general health improvement is due in large part to the new Health Centre Service. This, however, has not yet come to its full development and the older system of district surgeoncies is still maintained. There are six pathological laboratories, namely at Johannesburg, Cape Town, Durban, Port Elizabeth, East London, and Bloemfontein, which dealt with between 600,000 and 700,000 specimens during the year. At the Vaccine Institute, Rosebank, anti-variola lymph is prepared; 310 calves were successfully vaccinated and close on 218 litres of lymph obtained. During the year, penicillin and biological products derived from human blood were brought under control of the Therapeutic Substances Regulations.

A few diseases call for special remarks: *Amoebiasis*, made notifiable at the beginning of 1945, accounted for the greatest number of notifications of infective disease in Natal and Zululand, *viz.* 199 per 100,000; in Durban alone, 4,410 cases were notified, nearly two-thirds of the total, 6,637. *Diphtheria* came next, with 29.6 per 100,000. *Schistosomiasis*, widespread in the Union, is all too common among schoolchildren in the Pretoria district. At Klipdrift school some 17 per cent. were infested; at Alma, as many as 22 per cent. The death rate from *cancer* continues to rise and this year has reached the peak figure of 111.96 per 100,000. It is hoped that the Health Centres, by introducing periodic examinations, will bring about earlier diagnosis at a time when treatment may be avail-
of 7 cases being notified.
gratifying to note that

on their own initiative. APT is mostly used, a first dose of 0.2 cc. being followed in 4-6 weeks by 0.5 cc. Of 2,214 *leprosy* patients in the five Union hospitals, only 65 (2.9 per cent.) are Europeans. Epidemic *malaria* in Natal and Zululand is associated with *A. gambiæ*. There is organized control over the coastal areas to the south, but infection is spreading westward where such control is not in force. Measures adopted in the different districts are detailed, and quinine depots have been established. A map reproduced in the report shows clearly the distribution of cases of *plague* during the last quarter of a century. The most active foci at present are in the northern Orange Free State, the

border of the Transkei and the districts of Uitenhage and Port Elizabeth none was reported from Basutoland or SW Africa. A Plague Research Laboratory has been established and there is also a mobile laboratory for facilitating field work. *Enteric fever* constitutes a serious problem it has been

by an African working at one of the dairy farms supplying the depot. The question of pasteurization of milk was debated but there is no little opposition and even more indifference to its introduction. *Veneral disease* as would be

into complacency by the new and improved

Research making vaccine and carrying out immunity tests

The subjects of *Nutrition and Housing Schemes* are treated in some detail particularly the latter and remarks are made on rural sanitary conditions in Cape Province Natal the Orange Free State and the Transvaal and also on *maternity child welfare and the dental service*

Finally *the Nursing Service*. At the end of the year there were 10 637 nurses on the register of the South African Nursing Council and 7 232 midwives. The standard of nursing examinations is indicated by figures which show that about one third of the candidates failed at some stage.

The report contains several other points of local rather than of general

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A sketch with much information in a condensed form of the conditions. As in the colonies and many diseases y known is stated l more resistant to

disease than are those living on manioc (cassava). In Indo-China the great development of rice-growing in recent years is converting the country into one "vast rice-field" and so putting an end to the seasonal returns of famine. Attention is being paid to infant welfare, but scarcity of midwives, nurses and health visitors sets a limit to what can be done. Short courses are given to instil certain women with the main principles, but on return to their villages these soon grow hazy in their knowledge and revert to the old customs. Nevertheless, improvement has taken place. In Equatorial Africa, consultations for infants have risen from 6,000 in 1935 to 100,000 in 1945, and for those from two to five years of age from 14,000 to 120,000. Orphanages have been established for rescuing and educating abandoned half-castes, and helping them to earn their own living. Doctors, midwives, male and female nurses are being trained at schools established at Hanoi, Antananarivo and Dakar.

As regards diseases: *Smallpox* has been largely conquered. In August 1943 some cases appeared at Fort Lamy, imported by nomads. Vaccination was intensified, but was disappointing, at least at the beginning. Vaccine obtained from Paris which had been kept in reserve gave only 33 per cent. positives; it had been kept too long. A dried vaccine from America proved useless. Finally, the authorities at Lake Chad set the Fort Lamy centre going again and a satisfactory lymph was produced. During 1945, 626,873 smallpox vaccinations and 78,291 combined smallpox and yellow fever vaccinations were performed.

Human trypanosomiasis is decreasing in most districts. In French West Africa, 4½ million persons were seen [period not stated] and 300,000 were diagnosed and treated. Fresh infections, which in 1938 numbered 2.57 per cent., were in 1945 only 0.4 per cent. In French Equatorial Africa, of a total population of about 3,800,000, nearly 40 per cent. (1,472,700) were examined [period not stated] and 7,600 cases diagnosed. Fresh infections have fallen from 0.7 per cent. in 1941 to 0.43 per cent. in 1945.

Malaria remains a serious menace. In Madagascar and Réunion the scourge is far from being mastered. In 1945, 26.1 per cent. of all hospital patients seen were suffering from malaria [type not stated]. The small-scale measures hitherto undertaken are quite inadequate.

Leprosy is still rife, owing partly to general malnutrition and partly to promiscuous contact. Certain centres exist, as at Bamako in French West Africa, and Mozoariva in Madagascar, where agricultural colonies are established and seem to be a success.

Plague is under control both in West Africa and Madagascar and a live vaccine, E.V. strain, prepared at the Pasteur Institute, Antananarivo, is used. More than three million have been vaccinated with it and the number of cases of infection has fallen from 631 in 1939 to 184 in 1945.

Yellow fever occurs only as isolated cases in the villages and no connexion can usually be traced between them. In French West Africa, there were 23 cases in 1941, but only two in 1944, neither having been vaccinated. The total of vaccinations (Laigret's vaccine isolated by him with Sellards) has increased from eight millions in 1941 to fifteen millions in 1945. In French Equatorial Africa, there has been no case since the nine recorded in 1941.

Cholera is clearly retreating and the *dysenteries* and *tuberculosis* cause no alarm [no figures given]. *Syphilis* is still rife and plays no small part in infant mortality.

Among new sera prepared is one against the venom of *Naja melanoleuca* which is highly toxic, but has feeble anticoagulant and haemolytic actions; that of *Dendraspis jamesoni* is slightly less toxic and has weak haemolytic and proteolytic actions but is markedly anticoagulant.

Lastly a permanent Commission has been appointed for the study of ethnological problems [This is an interesting summary of conditions in the French tropics] H Harold Sott

BASU N K LAL S B SHARMA S N Investigations on Indian Medicinal
Plants Part I *Asteracantha longifolia* (BASU & LAL) *Quart J Pharm &*
Pharmacol 1947 Jan Mar 20 No 1 38 9 *Trianthema monogyna* Linn
[BASU & SHARMA] *Ibid* 39-41 *Boerhaavia diffusa* Linn [BASU &
SHARMA] *Ibid* 41 2

BOOK REVIEWS

BUXTON Patrick A [CMG FRS Director Department of Medical Entomology London School of Hygiene and Tropical Medicine Professor of Medical Entomology University of London] *The Louse An Account of the Lice which Infest Man, their Medical Importance and Control* 2nd Edition pp viii+164 47 figs 1947 London Edward Arno'd & Co [10s 6d] [This review appears also in *Bulletin of Hygiene*]

It is nearly eight years since the first edition of this work was published. The new edition records the extensive advances in knowledge of the louse achieved during the war years. The revision was completed early in 1945 and includes published work up to the end of 1944. It is nearly half as long again as the first edition but this increase is compensated by the deterioration of paper and binding so that the size and the weight of the book remain unchanged. Comparing the two editions one is impressed by the little we knew about the louse and how to control it in 1939. Every aspect of the subject morphology physiology ecology and control has been studied in these last years. There is new knowledge of the mouth parts of lice and their sense organs. Their sensory physiology and behaviour under controlled conditions have been described in detail. There is room for increased knowledge of their behaviour in their normal environment but here also advances have been made. We have detailed information on the distribution of lice in the various seams and regions of the clothing and a little is known of their movements in this environment. The temperature relations of the egg that is the lethal high at which development and hatching can occur as well as the no combination of temperatures under which eggs can hatch as late as one month after laying. The evidence collected during the war supports the view adopted in the first edition that the head louse and body louse are well defined biological races or species in the making and that the conversion of one sort into the other does not readily occur. The vexed question as to whether some persons are more susceptible to infestation than others is still not fully resolved. Some progress has been made in feeding lice through membranes but this technique does not seem to have been put on a really practical basis. Several generations have been reared on the rabbit when the skin was closely shaved. It is in the chapter on the control of lice that the most spectacular transformation has taken place. The homely methods of control which figured in

the first edition are now of little more than historic interest. The hopes which the author expressed in 1939 that we might find an insecticide "capable of being applied to a clothed unbathed soldier" and "substances with which garments might be impregnated" have now been realized. In this chapter, which has been entirely re-written, will be found details of the uses and methods of application of DDT as well as all the other insecticides that have been used with more or less success during the war: the thiocyanates, notably the "medicated (lethane) hair oil" of the National War Formulary, developed by the author for the control of head lice; diphenylamine; his-ethyl xanthogen; the improved pyrethrum powders; gammexane, etc.; as well as the modern methods of fumigating clothing and bedding. The first edition was a good book; great advances in knowledge have made the second a far better one.

I. B. Wigglesworth.

WAR OFFICE. Memoranda on Medical Diseases in Tropical and Sub-Tropical Areas. Eighth Edition. 396 pp., 76 figs. & 37 pls. 1946. London: H.M. Stationery Office. [7s. 6d.]

The eighth edition of this manual is a great improvement on any former edition, for a number of reasons. It is now bound in stiff covers of admirable quality, and is printed throughout on art paper such as is rarely seen at the present time. The pages are somewhat bigger than in the previous editions, and the print is much better. Many new illustrations by Mr. J. H. GRUNDY have been incorporated, both line and half-tone drawings, and lovers of clear draughtsmanship will take delight in the expressive accuracy of his entomological drawings. They have been made from actual specimens, and they contain nothing unessential, and no guesswork.

The layout of the book is as before, with some modifications; diseases are still dealt with in alphabetical order, and paratyphoid fever, therefore, is separated from typhoid fever by a hundred pages of plague, rickettsial infections, sulphonamide drugs, tropical eosinophilia and other items beginning with appropriate letters. But kala azar and oriental sore are at last brought together under the heading of leishmaniasis, and amoebiasis now includes liver abscess. But the alphabetical system (*pace* the remarks in the preface) has nothing to commend it. In this preface, Sir Alexander HOOD writes that the book "does not claim to be more than a series of miscellaneous memoranda arranged in alphabetical order", but 6 new sections have been added (infective hepatitis, leprosy, nutritional diseases, sulphonamide drugs, tropical eosinophilia, and the uses of DDT) and it is now almost a text-book (though this is specifically disclaimed), with a reasonable index. The place for a chapter on arthropod pests should not, the reviewer feels, be between chapters on ancylostomiasis and beriberi, nor that on the sulphonamide drugs between sprue and tropical eosinophilia. A more reasonable order of contents could very easily be made.

Much of the book has been rewritten, and the results of war experience have been incorporated, especially in relation to malaria and typhus, the dysenteries and sprue; but the chapter on filariasis is inadequate, in view of the apprehensive interest it created at one time in the troops, and of the fact that the fears were unjustified. In the description of schistosomiasis the Nile is referred to frequently, but the prevalence of the disease throughout the rest of Africa, though mentioned, is not stressed; yet this disease caused trouble enough during the war. On the other hand, treatment is reasonably well covered. The book is, of course, chiefly concerned with the clinical features of the diseases described, and though prevention and prophylaxis are referred to, and in some parts emphasized, they are subsidiary.

Charles Wilcocks.

Tropical Diseases Bulletin

—DR P. Granville [OBE DSc etc] *Vital Statistics and Public Health Work in the Tropics* including Supplement on the Genealogy of Vital Statistics. Foreword by Major GREENWOOD DSc FRCP FRS etc. 2nd Edition pp xii+268 1947 London Baillière Tindall & Cox 7 & 8 Henrietta Street W C 2 [15s.]

That there is an urgent need for reliable—indeed sometimes for any—vital statistics from tropical countries would hardly be denied. The development of appropriate public health measures and the application of preventive medicine are to a considerable extent dependent upon them. It will more often however be argued that it is quite impossible to gather them amongst native races and that in urging their importance the statistician merely lives in a world of dreams. It is more often true that the statistician is no less conscious of the difficulties than his non-statistical colleague and he is also aware of two other things—that if nothing is attempted before perfection is attainable then nothing will ever be done and that dependable results can often be reached by sampling methods when a full account is impossible. That something is being done that more persons today are alive to what can be a fascinating as well as a utilitarian subject of study is indicated by the demand for this second printing of Dr Granville Edge's admirable handbook. In it he discusses very clearly how one may set about answering arithmetically the superficially simple questions he himself propounds—*what is happening how and when do specific happenings occur why do these specific happenings occur?* That the approach by Dr Edge's personal experience of tropical conditions and his wide knowledge of the medical and vital statistical reports issued from British Colonial Possessions. To the present edition he has added a supplement entitled *the Genealogy of Vital Statistics* in which in some 75 pages he traces the rise (and at times the fall) of vital statistical thought and activities. To workers in the tropics this addition will certainly be of interest for it briefly reveals how systems of recording naturally grew from small beginnings and indicates how some of the pioneers could put to valuable use the very imperfect material at their disposal. *J. Bradford Hill*

TROPICAL DISEASES BULLETIN.

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SUMMARY OF RECENT ABSTRACTS.*

VIII. TYPHUS GROUP OF FEVERS.

General.

ANIGSTEIN (p. 1031) discusses the nomenclature of the pathogenic rickettsiae and the diseases to which they give rise, without reaching any final decision. In comment, MEGAW restates briefly the arguments in favour of a classification of the typhus diseases by the vectors concerned, and gives his opinion that the time is not yet ripe for a final pronouncement on the nomenclature of the rickettsiae.

MOOSER (p. 611) has written a monograph on the relationship between murine and classical typhus, in which he maintains that the differences between *Rickettsia prowazeki* and *R. mooseri* are quantitative, but constant and therefore specific. He thinks that fleas may play a part in maintaining infection with *R. prowazeki* in inter-epidemic periods, and disagrees with the theory of carry-over by inapparent cases. GROUPE and DONOVICK (p. 726) have shown that there are specific differences between epidemic and murine rickettsiae, by vaccinating mice with each strain and challenging with toxin derived from each strain; there was marked homologous, but no heterologous, protection in the doses employed. In relation to epidemic and murine typhus, HAMILTON (p. 320) records findings which suggest that complement-fixing antibodies are not identical with toxin-neutralizing antibodies, and that the toxins associated with the two diseases are distinct. CRAIGIE *et al.* (p. 914) have shown that, in the strains tested, epidemic and murine rickettsiae contained a common thermostable antigen, but that each had a type-specific thermolabile antigen.

PLOTZ *et al.* (p. 725) show that the complement-fixation test is the most reliable method of differentiating the rickettsiae of murine typhus, epidemic typhus, and *Rickettsia prowazeki*, provided that the common antigen is used. In contrast to the uncertain indications yielded by the febrile and scrotal reactions. MEGAW, in comment, points out that further investigation will be needed to show whether this is true of all strains.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

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treated within the first 3 days of illness there were no deaths in the series of 25 (8 deaths in 44 not so treated) and the attacks were all mild. It appears however that para aminobenzoic acid had a more favourable effect on patients who came under treatment after the third day. RAETIG (p 211) writes emphatically in favour of human convalescent serum in the treatment of typhus: prefers doses of 40-60 cc given daily by the intravenous route rather than single large dose.

SCHÖNBRUNNER (p 118) writes of the value of strophanthum and digitalis in typhus whether the circulatory failure is due to myocarditis or to damage to the vasomotor centres.

BERGER and BRZEZINSKI (p 543) have shown that certain sulphonamides have some power to neutralize the toxic effect of injection of typhus rickettsiae and that this antitoxic action is inhibited by β aminobenzoic acid.

ANDREWES *et al* (p 427) have written a highly technical paper on the antitoxic action of β sulphonamidobenzamidine and related compounds in human cases of typhus. They show that large doses of vitamin C in rickettsial action of typhus have an antipyretic action but may themselves be toxic and have no anti rickettsial effect. In human cases of typhus (epidemic type) there was some slight evidence of benefit but death took place in 5 of 23 patients so treated. *In vitro* there is no evidence of anti rickettsial action other than that attributable to the acidity of ascorbic acid. D'IGNAZIO (p 1130) claims that treatment with intravenous vitamin C and intramuscular vitamin B₁₂ produces obvious improvement in typhus and their collaborators at the National Institute of Health Washington (p 18) carried out researches on typhus during the war which were published only in 1945. These papers contain much detail on the preparation and properties of vaccine against epidemic typhus strains measure antibody provoked by this substance on the antigenicity of various strains of the rickettsiae and on a precipitin test in typhus fever. Readers should refer to the originals.

CRAIGIE (p 834) describes two methods of purifying intravital yolk-sac suspensions of rickettsiae for the preparation of vaccine and TOPPING and SHEPARD (p 910) describe three methods of preparing antigen from yolk sacs infected with rickettsiae which are all based upon Craige's diethyl ether method. Details are given in the original.

Although the toxic and the complement fixing substances formed during the growth of *R. prowazekii* are not identical the former being destroyed by formalin and ether and the latter not. GROUTÉ and DOVOVICK (p 635) have shown that the titres of both increase the longer the embryos live after inoculation. Vaccines prepared from embryos alive after 7 days are much more protective than those from embryos dead in 5 days.

DOVOVICK *et al* (p 635) show that a direct determination of the antigenic titre of a vaccine of *R. prowazekii* by the complement fixation test appears to give an accurate measure of its protective value for guinea pigs.

ECKE (p 116) shows the Weil-Felix and the rickettsia-agglutination titres in a group of persons vaccinated with the Weil-Felix and the Cox type epidemic typhus vaccine and that a stimulating dose did not greatly or for long increase the titre of the Weil-Felix though the effect on the complement fixation test was quite striking. There was considerable cross fixation when epidemic and murine antigens were used which indicates that *R. prowazekii* and *R. mooseri* may be variants of the same species rather than separate species. He (p 542)

shows that fevers other than typhus do not, for all practical purposes, give rising titres of these tests in persons who have previously been vaccinated against typhus.

D'IGNAZIO and CODELEONCINI (p. 1131) have used the Weigl vaccine in Abyssinia; even in relatively small doses it reduces the incidence and severity of the disease in exposed persons.

In Algeria, Blanc's live murine vaccine was used with striking success in the epidemics of louse-borne typhus which occurred during the war, but a drawback

vaccines, for insecticides could only be used on a small scale (GRENOILLEAU, p. 22).

reliable in differentiating the diseases in vaccinated persons provided that allowance is made for a high degree of cross-fixation. ECKE *et al.* (p. 545) report

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administration of vaccine during the incubation period may reduce the severity of the disease, and vaccination should therefore be carried out even during an epidemic. SILVA and KOPCIOWSKA (p. 428) report two cases of typhus, both mild, in laboratory workers who had repeatedly received injections of vaccine.

Control.—CHALKE (p. 911) relates the experiences of the British forces in North Africa and Italy, in relation to typhus. Vaccination with the living murine vaccine of Blanc, and disinfection, were used for native labourers in Algeria, but in Italy, reliance was chiefly placed on the insecticidal powders.

large-scale use of DDT. The same point is made by CRAUFURD-BENSON (p. 638). CRAUFURD-BENSON and MACLEOD (p. 638) describe the steps which led to the composition of the original British Army louse powder A.L.63, a mixture of naphthalene, high boiling tar acids, derris root and China clay. Applied to garments, the powder protected against infestation for about 8 days.

WHEELER (p. 639) gives an account of the use of DDT in Naples and Southern Italy, 1943-44, when the epidemics of typhus were quickly brought under control; he describes the organization controlled by the U.S.A. Typhus Commission. DAVIS (p. 427) has written an account of the means taken to control the typhus epidemic found when the Belsen camp was entered. Dusting with DDT brought it to an abrupt end, and this is strong evidence that transmission had been effected by living lice rather than by dry louse faeces.

this to the extensive campaigns of disinfection with DDT that were inaugurated. There was little disinfection of clothing or administration of vaccine. ORTIZ-MARIOTTE *et al.* (p. 324) show how, by the use of DDT, an epidemic of louse-borne typhus was brought to an end in Mexico. VIEL and ROMERO (p. 545) draw attention to the ease with which an outbreak of typhus in Chile was

controlled by the use of DDT compared with another outbreak which occurred before DDT was available

Flea Typhus

and FISCHER (p 546) describe four cases of typhus of the murine type in the Belgian Congo in 1946

claims to have seen a patient sick or healthy and states that the patient's blood to saline. He claims great advantage in the method of Lestoquard which he describes. These are unusual findings and are not likely to be accepted without confirmation. LE GAC (p 916) describes a typhus-like fever of the Upper Ivory Coast and French Equatorial Africa in which there is strong though not conclusive evidence of rat flea transmission from wild rats. Tests with the recognized strains of *Proteus* are inconclusive. Of 10 cases of typhus treated in Calcutta mostly in patients from the city 4 were diagnosed as scrub typhus 4 as murine 1 as tick typhus and 1 indeterminate (LOWE p 1129).

WOODWARD *et al* (p 836) show that murine typhus is present in rats in the Philippines and mention three human cases. They report on an epidemic of typhus in a poor house in China in 1946 which was regarded as murine but in which the source was not determined.

MILLER and LANE describe murine typhus in Georgia, U.S.A. and remark that contact with the faeces of rat fleas or with urine of infected rats must be considered as possible means of human infection. STUART and PULLEN (p 836) think that the incidence of human cases of murine typhus in New Orleans is increasing. It is most prevalent in summer and early autumn. DAVIS and POLLARD (p 1033) found complement fixing antibodies to a murine antigen in 35 per cent of persons engaged in food handling in Texas. It appeared that in many cases the disease had never been recorded presumably because the attacks were sub-clinical.

PASCALE and CRUZ (p 546) report cases of murine typhus from Brazil and cases in which *Proteus* OYA was agglutinated. In comment MEGAW suggests that the *Proteus* strains used in the tests were not always true to type. From an examination of the seasonal variations in rats fleas and lice RUMREICH and KOEFKE (p 429) conclude that *Xenopsylla cheopis* is the principal or an important vector of murine typhus in certain parts of the United States but that there is no evidence that it is so in Honolulu.

GRIFF and PINKERTON (p 22) show that the growth of murine rickettsiae in the yolk sac of hen's eggs is affected by temperature and by the introduction of potassium cyanide solution or toluidin blue. In suitable doses the potassium cyanide greatly stimulated the growth of rickettsiae but this substance did not neutralize the inhibitory action of para aminobenzoic acid. In this paper

that complement fixation tests for murine typhus in an endemic area. GRIFF (p 915) discuss the results of these tests which have previously been reported.

obenzonic acid was of great value in the treatment of murine typhus but it is necessary to use it with caution.

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SMITH (p 1131) makes some value in 29 cases of murine typhus but it is necessary to use it with caution.

in patients with kidney or liver damage. ANDREWES *et al.* (p. 728) show that methylene blue and toluidine blue have some therapeutic action when administered orally or subcutaneously to mice infected by the nasal route with murine rickettsiae.

PLOTZ and WERTMAN (p. 429) have observed that in persons vaccinated with epidemic-typhus vaccine, subsequent infection with murine typhus leads to anomalous results with the complement-fixation and rickettsia-agglutination tests; moreover, the vaccine had little or no effect on the severity of the attack of murine typhus.

The rat-control programme adopted for the control of murine typhus at Memphis, Tennessee, is described by BEALL (p. 639).

Proteus OXK type. Vector: mite.

Epidemiology. Transmission.—MACKIE *et al.* (pp. 917, 1132) give a comprehensive account of the American investigation into scrub typhus in Assam and Burma, during which the rickettsia was found in wild *Rattus flavipectus yunnanensis*, in the tree shrew *Tupaia belangeri versurae* and in mites obtained from *R. rattus sladeni*. The only mite found infected was *Trombicula deliensis*. Partly-fed mite larvae would re-attach themselves to new hosts, and could infect them. In the discussion of the second of these papers, MELLANBY mentioned the protective properties of benzyl benzoate, and SAYERS the fact that there was a seasonal factor, with highest incidence in August or September.

LUSK (p. 426) shows that the great majority of a series of 114 cases of typhus fever, admitted to an Indian military hospital in Calcutta, were of the *Proteus OXK* (and presumably mite-borne) type. A few were flea-borne or tick-borne. The patients came from Calcutta or from a village 80 miles away.

PHILIP *et al.* (p. 733) describe 222 cases of scrub typhus in American troops who reoccupied the Philippine Islands. *Trombicula deliensis* and *T. akamushi* were found, the important host being *Rattus mindanensis*.

ANDERSON and WING (p. 326) describe an outbreak of scrub typhus among troops on a Pacific island.

PHILIP and KOHLS (p. 119) have, for the first time, found larval *Trombicula deliensis* infected with *Rickettsia orientalis* in nature, in a small island in the Pacific which is uninhabited except for periodic visits to collect coconuts, and which swarms with *Rattus concolor* b. contracted by at least 26 of 41 men

JOHNSON and WHARTON (p. 640) c implicated in scrub typhus and the habits of the rat hosts, which tend to nest in places c (e also deals with prevention, mentioning use on clothing, DDT for soil, and rat control.

FINNEGAN (p. 262) has written a monograph on Acari which transmit fevers of the typhus group in the Far East.

Aetiology.—TOPPING (p. 31) found cross-immunity between 4 strains of *Rickettsia orientalis* from different countries of the Far East, though they differed in virulence. IRONS (p. 734) has shown experimentally that strains of *R. orientalis* of high and of low virulence to mice are found in different places, and that they are associated with severe and mild cases, respectively, in man.

HAMILTON (p. 734) describes vascular, nodular masses produced on the chorioallantoic membrane of 10-day embryo chicks on inoculation with *R. orientalis* and other rickettsiae.

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Tests.—IRON: Felix
reaction in rela paper

contains valuable charts showing the relationship though some of the conclusions are criticized by MEGAW.

DE BURGH (p 64⁹) has extracted from *Proteus* OAK a polysaccharide with which he sensitized collodion particles. These were agglutinated by sera of two patients convalescent from scrub typhus at the same titre as suspensions of *Proteus* OAK. This polysaccharide also gives positive results in a precipitin test.

WOLFE *et al* (p 73⁵) have worked out a method of large scale preparation of the complement fixing antigens from yolk sac cultures of *R. orientalis*. This can also be applied to other rickettsiae. The antigens are moderately active and strictly specific when subjected to complement fixation tests. BENGTSON (p 55¹) found that the complement fixation titres of aninals and human beings infected with different strains of *R. orientalis* vary very greatly according to whether homologous or heterologous antigen is used in carrying out the test. Cross-immunity exists between the strains used and it remains to be found whether there is an association between the fixation titre and the degree of immunity.

SMADDEL *et al* (p 54⁷) have found soluble antigens in the tissues and body fluids of mice and rats infected with two strains of scrub typhus rickettsiae. These were specific. They could be found up to about the 6th day but not longer presumably because by that time neutralizing antibodies had been formed.

O CONNOR (p 64²) notes that *R. orientalis* grown in duck embryos may cause agglutination of fowl red cells (the Hirst phenomenon) and that serum of patients with scrub typhus may inhibit this property.

Pathology.—ALLEN and SPITZ (p 75) have conducted a detailed histological examination of material from a considerable number of cases of scrub typhus epidemic typhus and Rocky Mountain spotted fever. There is of course a great similarity between these diseases but the authors point out certain finer details in which they differ. It is not possible further to summarize this paper. SETTLE *et al* (p 27) also give a detailed description of the pathology of scrub typhus and compare this with the pathology of other fevers of the typhus group. They make the point that the tissue changes in these diseases do not differ in essentials. For details the original should be consulted. MCGOVERN (p 30) describes the pathology of scrub typhus emphasizing that myocarditis, pneumonitis and meningo-encephalitis in this disease appear to be secondary to vasculitis.

Clinical findings.—ANDREW (p 121) from Queensland shows that in severe scrub typhus the incubation period tends to be about 12 days. In less severe forms it tends to be rather longer up to 18 days. The same author (p 54⁹) describes a sudden diuresis which was a feature of a group of severe cases of scrub typhus in Queensland. It usually began on the 10th 16th day of disease and was accompanied by striking improvement and disappearance of oedema which had been masking the pronounced degree of anaemia from which the patients suffered. The author argues that these findings reinforce warnings against deranging fluid balance in scrub typhus by intravenous infusions.

Descriptions of the clinical features of scrub typhus are given by several authors (TATTERSALL p 28, TATTERSALL & PARRY p 430, SANGSTER & KAY p 29, KLEIN p 120, ANDERSON & WING p 326, GRIFFITHS p 431, BROWNING *et al* p 548, MENDELL p 548, AGRESS & EVANS p 549). The incidence of primary ulcer varied. It was 9–11 per cent in Tattersall's series but from 34 to 92 per cent in the rest. The rash was seen (in white patients) in 28–98 per cent. Enlarged glands were common (90–100 per cent) and splenomegaly fairly common (25–47 per cent) [but malaria may have been a factor].

Cough, and signs of chest trouble, were present in 40-100 per cent., eye troubles in 45-71 per cent., and deafness in 15-35 per cent. The usual accompaniments of fever—headache, backache, flushing etc.—were seen, but secondary fever was also reported in 15-17 per cent of Tattersall's cases. Haemorrhage occurred from mucous membranes in 9 and 33 per cent. of two series. The case mortality rates varied from 2.6 to 12 per cent.

DESHMUKH (p. 432) gives details of the clinical picture in 200 severe cases, out of 615 in East African troops in Burma, and of the post-mortem appearances in fatal cases.

SANGSTER and KAY (p. 29) note that the clinical picture in scrub typhus in New Guinea was complicated by malaria and other diseases. They mention cardiac dilatation occurring about the 12th-14th day in severe attacks, and the importance of complete rest for 6 weeks from the onset.

DONEGAN (p. 550) describes the appearance to be the result of vascular sequelae of scrub typhus.

HICKS (p. 1134) found reactions at 1 in 50 with *Proteus OXX* in greater proportions of people exposed to scrub typhus, and in Natives of New Guinea, than in others not exposed. He thinks that sub-clinical infection may occur [compare DAVIS & POLLARD, and JOHNSON & DAMON, *Flea typhus*, above].

HOWELL (p. 327) notes that there were no abnormal electrocardiographic patterns in 200 consecutive patients convalescent from scrub typhus. SOKOLOV and GARLAND (p. 432) describe the cardiovascular disturbances in a number of men referred for special observation after scrub typhus. The symptoms were weakness, dyspnoea, tachycardia and pain, and some minor electrocardiographic changes were found in a few cases. The pathogenesis is doubtful, but all the evidence went to show the disturbances were due to scrub typhus. Treatment resulted in progressive improvement. LIKOFF (p. 1133) found electrocardiographic abnormalities in 10 of 100 patients observed for 7 weeks after scrub typhus; in 5 these changes persisted for 7 weeks. The most significant were bundle-branch block (2 patients) and intraventricular block (1 patient).

ROMEO (p. 1133) gives his opinion that patients who survive scrub typhus make complete and permanent recovery. The first step in convalescence is to dispel the apprehension common in this disease. In comment, MEGAW agrees in principle, but points out that the case-mortality rate in this author's series was only 4 per cent., and that in more severe outbreaks the end results may not be so good.

Treatment.—TOPPING (p. 212) shows that immune rabbit serum is useful in the treatment of mice infected with homologous strains of *R. orientalis*, even as late as 72-168 hours after infection. He thinks that scrub typhus is specially favourable for serum treatment because the presence of the eschar permits immediate diagnosis.

MURRAY *et al.* (p. 433) show that *p*-aminobenzoic acid has very considerable effect in the treatment of scrub typhus. The results on fever, symptoms and severity were very promising, in comparison with the course of the disease in alternate-case controls. Overdosage led to mental confusion and leucopenia but these did not persist. Details of treatment, and the precautions to be taken, should be sought in the original.

ZARAFONETIS *et al.* (p. 922) found that gerbils which had recovered from experimental infection with scrub typhus with the help of *p*-aminobenzoic acid (3 gm. daily for 3 days, but was modified for different patients). The results on fever, symptoms and severity were very promising, in comparison with the course of the disease in alternate-case controls. Overdosage led to mental confusion and leucopenia but these did not persist. Details of treatment, and the precautions to be taken, should be sought in the original.

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acid showed complete immunity afterwards thus indicates that the action of this substance is to inhibit the growth of the rickettsiae rather than to kill them

Inoculation.—FULTON and JOYNER (p 435) describe the cultivation of *R. orientalis* in the lungs of mice and cotton rats after intranasal instillation and the preparation of a vaccine from the lungs. After a few passages the strain produced lesions which were constant. Bacterial infection of the animals was controlled by means of sulphathiazole. The vaccine afforded a moderate protection to experimental animals but the authors argue that this is not a certain criterion of its effect in man which can be determined only by a field trial. [The war ended before the vaccine could be used in man on a large scale.] BUCKLAND *et al* (p 436) have recounted the story of the large-scale production of scrub typhus vaccine by the method described above. For the full details of this remarkable achievement the original should be consulted.

SWADEL *et al* (p 919) describe the preparation of a vaccine of *R. orientalis* from the lungs and spleens of white rats infected intravenously. Tests in man indicated that this vaccine was as potent as the cotton rat lung vaccine or the tissue culture vaccine. By this technique bacterial contamination was not a problem as it is in the cotton rat lung method in which the animals are infected intranasally.

PLOTZ *et al* (p 920) describe the preparation of a tissue culture vaccine of *R. orientalis* which though large scale preparation would be difficult gives a clean product and could be used for the protection of small groups. The authors note that no yolk sac vaccine of this species has been successful partly because of the deleterious effect of ether on the antigen.

VAN DEN ENDE *et al* (p 918) report 4 cases of scrub typhus in persons engaged in preparing vaccine for that disease and handling infected cotton rats. They had all previously been vaccinated and though the disease was severe in two there were no deaths and the vaccine therefore is thought to have given some protection.

Control.—In one outbreak of scrub typhus in United States troops in Dutch New Guinea there were 931 cases and a case mortality rate of 3.65 per cent. GRIFFITHS (p 431) describes the semi cleared grassy areas in which most of the cases occurred and states that removal of grass and undergrowth was an effective measure of control and that when the top soil had eventually dried after this procedure the area was considered safe. There was no evidence that rat control was of any practical value but impregnation of clothing with a soap emulsion containing dimethyl phthalate was strikingly successful. BUSHLAND (p 922) impregnated garments with an emulsion of 5 per cent dimethyl phthalate in soap and water and found that this gave good protection for 5 weeks against larval mites in New Guinea. Protection was lost after proper laundering. The same author (p 923) shows that benzyl benzoate and dibutyl phthalate are even more effective and withstand washing better. He describes investigations made in Australian troops on the efficacy of dimethyl phthalate in preventing scrub typhus and scrub itch. He notes that dimethyl phthalate kills but does not repel mites. One ounce of dibutyl phthalate (which is more efficient than dimethyl phthalate) is enough for one set of service clothing and the protective effect survives washing with soap and running water (as available to troops in the field) up to 8 times though two laundry washings destroy the protective action. Woollen clothing (including socks) loses protective action more quickly than cotton. The substance rarely irritates the skin. Experience showed that the protection offered was very effective.

Indeterminate type. Vector: tick.

BRODY (p. 1036) reports a case apparently of tick typhus in N. Queensland, noting that this disease had not previously been recorded in Australia.

SOMERS (p. 327) describes the first case of tick typhus to be reported from the Sudan. CHARTERS (p. 551) reports 5 cases diagnosed as tick typhus, in Abyssinia; he suspects that the vector was *Rhipicephalus sanguineus*.

BUSTAMANTE *et al.* (p. 1134) have isolated two strains of the rickettsia of Rocky Mountain spotted fever (western type) from *Rhipicephalus sanguineus* in Mexico. MAZZOTTI and VARELA (p. 1135) maintained a strain of the rickettsia of Rocky Mountain spotted fever for 345 days in *Ornithodoros furcosus*. The tick transmits the infection through the egg at least to the first generation.

SHEPARD and TOPPING (p. 735) produce evidence which suggests that dogs may be reservoir hosts of Rocky Mountain spotted fever, as they are of other tick-borne rickettsial diseases. JELLISON (p. 31) discusses the geographical distribution of one species of cottontail rabbit, *Sylvilagus nuttallii* (an important host of *Dermacentor andersoni*) in relation to that of Rocky Mountain spotted fever in U.S.A. The correspondence is very close, and other species of *Sylvilagus* occur in other American countries where this disease is found.

TRAVASSOS and VALLEJO-FREIRE (p. 642) describe the breeding of *Amblyomma cajennense*, its infection from rabbits infected with São Paulo spotted fever, and the preparation of a vaccine from these ticks.

HAMILTON (p. 434) describes the inhibiting effect shown by *p*-aminobenzoic acid on the growth of rickettsiae of Rocky Mountain fever in infected yolk sacs. The effect was less pronounced on the rickettsiae of other forms of tick-borne typhus, and was not found in the case of *R. orientalis*, *R. burneti* and certain viruses. ROSE *et al.* (p. 433) report a case of Rocky Mountain spotted fever in which treatment with *p*-aminobenzoic acid had a strikingly beneficial effect. ANIGSTEIN and BADER (p. 1036) quote experiments which indicate a strong protective action of *p*-aminobenzoic acid in guinea-pigs infected with Rocky Mountain spotted fever. The animals which recovered were found to be immune [compare ZARAFONETIS *et al.*, *Mite typhus*, above], but rickettsiae could be recovered from their spleens.

HARRELL *et al.* (p. 923) show that a high protein diet is beneficial in Rocky Mountain spotted fever.

GLASGOW and COLLINS (p. 924) have found a mixture containing DDT and pyrethrins, in oil, effective against *Dermacentor andersoni* when sprayed in areas infested by this tick.

Q fever. Trench fever.

MORRISSEY and DERRICK (p. 31) refer to the 216 cases of Q fever diagnosed in south-east Queensland in 10 years, and describe the first confirmed case in North Queensland. Bandicoots and cattle are numerous in the locality in which this patient lived, and *Haemaphysalis humerosa* has been reported in North Queensland.

IRONS *et al.* (p. 924) report an outbreak of Q fever in stockyard men in Texas.

PARROT (p. 328) suggests that some of the cases diagnosed in Algeria as "relapsing fever without spirochaetes" may be examples of trench fever, and describes a case.

Charles Wilcocks.

MALARIA

FERMONT D A Primary Malaria in London [Correspondence] *Brit Med J* 1947 July 5 31 2

This letter records a further case of malaria in London [see this *Bulletin* 1947 v 44 789 790]. The patient, a woman, had been ill with gastric flu and had been in hospital for some days. Two days later she moved to Hampstead. She

period but on the following day slides taken during a rigor revealed scanty trophozoites amoeboid forms and gametocytes of *Plasmodium vivax*. The patient was given mepacrine and has remained free of symptoms since her attack.

The patient had not been out of London since December 1946. She was born in India and lived in Calcutta until 1937 when she came to Britain. She had never had any form of antimalarial treatment hitherto. Her only illnesses have been German measles and 3-day fever 24 years ago. Her only known contact with malaria was when a friend staying in her home last March had a relapse.

[In view of the history of residence in the Tropics even though this was 10 years ago this case is not exactly comparable with those recently recorded as primary malaria in London.] H J O D Burke-Gaffney

MACKERRAS I M Malaria in the South West Pacific [Correspondence] *Med J Australia* 1946 Aug 17 v 2 No 7 249-50

The author refers to FAIRLEY's paper on Malaria in the South West Pacific [this *Bulletin* 1947 v 44 398] with special reference to the account of the Wewak epidemic in which a relatively mepacrine-resistant strain of *P. falciparum* was encountered. Some additional epidemiological information is supplied. Native infants at Wewak were remarkably tolerant of heavy infections and developed an effective immunity at an unusually early age. On the assumption that the minimum concentration of gametocytes of *P. falciparum* in the blood likely to infect mosquitoes is 40 per cubic millimetre the effective rate of native infants was found to be 4.5 per cent. The corresponding rate for native children and adults was zero. For Japanese prisoners on the day of their surrender 4 per cent and for Australian troops 0.6 per cent. Australian troops were therefore much more likely to obtain their infections from the Japanese or from native infants than from their fellows. This inference was supported by the results of mosquito dissections.

It is difficult to believe that mepacrine-resistance of the local strain of *P. falciparum* was a new character developed during the war for it failed to appear elsewhere even though during 1943 and the first quarter of 1944 many troops were receiving inadequate doses of mepacrine. Mepacrine resistance might have been an inherent incidental characteristic of a local strain or it might have developed by mutation and selection in the Japanese. It could scarcely have done so in Australian troops. The Japanese had been in occupation two years or more and they had atebirin.

Norman White

BATISTA, D. Contribuição ao estudo da protozoologia da malária na Amazônia. [Malaria in Amazonas, Brazil.] *Rev. Brasileira Med.* Rio de Janeiro. 1947, Mar., v. 4, No. 3, 226-31.

The author has analysed the protozoological findings in blood examinations for malaria at the Manaus Hospital during the four years 1940-43: The total examined at the laboratory was small, 801 altogether, of which only 276 were positive, 253 *P. vivax*, 14 *P. falciparum*, 8 with both these and one with *P. vivax* and *P. malariae*. Thirty-four patients were given adrenaline and 16 of these showed parasites in their blood thereafter, 14 *P. vivax*, 1 *P. falciparum* and 1 *P. ovale*. Figures are also given from the female section of the hospital for each year, as follows: 1940, 165 (23.1 per cent. of the total patients) and 9 deaths (5.4 per cent. case fatality); 1941, 247 (25.1) and 11 deaths (4.4); 1942, 269 (29.1), 11 deaths (4.0); 1943, 226 (26), 11 deaths (4.8). [The preparation, Several purporting to give the y those of a different specified period and the "positive findings" are recorded as "negative."]

H. Harold Scott.

SMOLENSKAJA, J. M. [On the Localization of Schizogony in *P. falciparum*, the Causative Agent of Tropical Malaria.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 5, 25-7. [In Russian.]

In order to determine the exact localization of the reproductive stages of *Plasmodium falciparum*, the author examined 240 cases of malignant tertian malaria and compared the parasites found in the peripheral blood, on the one hand, with those in the bone marrow, spleen and venous blood on the other hand. While material obtained by sternal and spleen punctures contained only ring-forms and corresponded in this respect to the blood taken from the finger, blood obtained from the subcutaneous veins of the upper (e.g. median basilic and cephalic veins) and lower extremities contained stages of schizogony in 7 per cent. of cases examined (100). The density of parasites in the venous blood was also greater than in that taken from the finger. From these facts it is concluded that the normal sites of schizogony are the

SOFIYEV, M. S. [*Plasmodium ovale* Malaria.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 4, 36-9. [In Russian.]

The author records observations carried out with a strain of *Plasmodium ovale* isolated in the Soviet Union by ESKIN [this *Bulletin*, 1938, v. 35, 814]. From 1936 to 1939, this strain infected 159 patients suffering from general paralysis, having been passaged both by blood inoculation and by mosquitoes. It is stated that in the course of 3½ years the strain retained the morphological peculiarities of *P. ovale*, thus proving that there was no admixture of *P. vivax*, as formerly suspected on account of the presence in the original strain of forms with characters of the latter species. The average incubation period following intravenous inoculation was 9.8 days, while that following subcutaneous inoculation was 13 days. The paroxysms appeared at intervals of 24 or 48 hours. The infections induced by blood inoculations terminated in spontaneous recovery, whereas those produced through the bite of mosquitoes had to be treated with acríquine.

C. A. Hoare.

[October 1947]

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and that the mortality amongst mosquitoes which have been able to feed and therefore tend to rest is certainly very high and closely approaches 100 per cent in completely treated rooms. Where there is no source of blood or where there are alternative untreated surfaces on which to rest a number escape. Though all doses were in one sense effective it is concluded that the optimal dose is 150 or 200 mgm/sq ft (5.3 or 7.0 oz/1 000 sq ft) but depends very much on the texture of the wall surface. The useful effect usually lasting 4 to 6 months. Recently applied lime wash neutralized the DDT 100 mgm/sq ft applied 3 months after lime washing lasted only 1 month. applied 1 month after such lime washing it lasted for a negligible period only. G Macdonald

Hess A D & Keener G G Jr The Effectiveness of DDT Residual House Sprays in controlling *Anopheles quadrimaculatus* Amer J Hyg 1947 Mar 45 No 2 133-43 1 fig

The special features of this work are that houses only were treated with DDT. Subsequent anopheline counts were made in houses and in untreated animal sheds and barns to detect any correlated reduction and the precipitin test was used to detect any changes in the feeding habits of the mosquitoes following DDT application.

Anopheles quadrimaculatus more frequently spends the day in barns (85 per cent) than in houses (15 per cent) of those caught in barns 2.7 per cent and of those caught in houses 5.3 per cent last fed on human blood. Treatment of houses only with 200 mgm DDT per sq ft (7 oz/1 000 sq ft) in the form of an emulsion of a strong oil solution applied by either hand or power-operated sprayers caused a virtual total disappearance of adult mosquitoes from the treated houses but did not cause any reduction in the numbers in adjacent barns.

Before treatment the percentage of mosquitoes containing human blood had been 3.5 and 2.7 in houses and barns respectively. After treatment it could not be estimated in house-caught mosquitoes as they were too few in number. In those caught in barns it dropped to 2.1 per cent in the next week and remained low though the decrease in individual barns varied very greatly. From a consideration of these data the authors conclude that the reduction in the numbers of human fed mosquitoes was about one half. From this calculable fact they draw the conclusions that the risk of transmission of malaria was decreased by an equal amount that treatment of houses alone is inadequate that the whole premises should be sprayed and that if restriction in the number of premises to be sprayed is inevitable barns should be treated in preference to houses. [The conclusion that the reduction in the numbers of human fed mosquitoes does not seem valid to the reviewer as it could be hypothesized that the conditions of the test would greatly increase the proportion of young and therefore uninfected mosquitoes. Since this cannot be estimated directly it seems more appropriate to use the sporozoite rate as a direct measure of the effect produced.] G Macdonald

Gahan J B & Payne G C Control of *Anopheles pseudopunctipennis* in Mexico with DDT Residual Sprays applied in Buildings Amer J Hyg 1947 Mar 45 No 2 123-32

The authors object in undertaking the work here described was to measure the effect of DDT residual spray treatment in the control of malaria not merely in the control or apparent control of anophelines and also its effect on another

species of anopheline not previously the subject of enquiry of this kind. This paper constitutes an interim report which deals only with the control of *Anopheles pseudopunctipennis*.

Work was done in the State of Morelos, in Mexico, in four villages, two test and two control, infested by *A. pseudopunctipennis* breeding in rice-fields; a recorded history of malaria in recent years was utilized for comparative purposes. In the test villages, a 5 per cent. DDT/oil/water emulsion was applied in April and May to all shelters, at average concentrations of 212 and 190 mgm. per sq. ft. ($7\frac{1}{2}$ oz. and 6.7 oz. per 1,000 sq. ft.) by means of a hand-operated wheelbarrow spray. The reduction of anopheline adults in each of the two test villages amounted to over 99 per cent. and persisted until the end of the observation period in October. There was a concomitant marked reduction in the numbers of larvae, estimated conservatively at 85 per cent. and more generously at 94 per cent. in neighbouring rice fields; this was attributed to reduction in the number of ovipositing females, which was most marked in May and June and had come to an end by October. The reduction was, however, greatest in the case of small larvae presumably because a higher proportion survived to maturity in the less crowded water, so that the proportion emerging as adults was probably reduced by 68 per cent. only.

G. Macdonald.

BRESCIA, F. Salt Marsh and Anopheline Mosquito Control by Ground Dispersal of DDT Aerosols. *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 698-715, 3 figs.

Details of numerous field experiments with DDT aerosols are recorded in this paper. The work was performed in Florida and Alabama against natural free populations of adult mosquitoes and larvae and against adults in cages and eggs and larvae in pans.

The chief mosquitoes were *Aedes sollicitans* and *Aedes taeniorhynchus*, but *Anopheles atropis* and *Psorophora ciliata* were also observed. In addition some tests were made in the Tennessee Valley swamp area against *Anopheles quadrimaculatus*. The aerosols were formed of equal quantities of oil, containing 10 per cent. dissolved DDT, and water; details of the generator will be published later.

Suitable meteorological conditions for this method of control were found to be a stable atmosphere, with the air temperature near the ground lower than that of the upper layers and a wind velocity of not less than 2 miles per hour.

size had to be increased when the wind velocity was 3 miles per hour or more, except in forest where the 10-micron particle had to be used to ensure penetration. With this output, residual effect was negligible; but a local deposit of 0.002 lb. DDT per acre killed 50 per cent. larvae of *Aedes sollicitans* and *Aedes taeniorhynchus* in 18 hours and 0.001 lb. DDT per acre killed nearly 100 per cent. larvae of *Anopheles quadrimaculatus* within 12 hours. H. S. Leeson.

HURLBUT, H. S., MAPLE, J. D., WILSON, C. S., FALLANDER, S. R. & HUSMAN, C. N. Observations on the Dispersal of DDT from Aircraft for the Control of Mosquitoes. *U.S. Nav. Med. Bull.* 1947, Mar.-Apr., v. 47, No. 2, 368-79, 2 figs.

War conditions often demand the immediate and virtually total destruction of the mosquito population in dense forest, though the need for this is less

likely to be common in peace. This paper describes four tests carried out in Guadalcanal and Guam, three for the control of adult mosquitoes and one for larval control. In them a 10 per cent solution of DDT in a mixture of cyclohexanone and mineral oil was sprayed from aircraft at a dose of 0.4 lb DDT per acre for adult control and 0.2 lb DDT per acre for larval control. The number of drops per square inch and the reduction in adult and larval mosquitoes was recorded. The adult mosquitoes biting were reduced by 98 per cent and the number of larvae by 99 per cent. It appears that a dose of 50 droplets per square inch is adequate for adult destruction (actual counts varied from 12 to 540) and droplets of less than 100 microns in diameter penetrated forest cover better than did larger ones.

G Macdonald

FLMENDORF J E. Jr assisted in Field and Laboratory Operations by K G BARNHILL & M TAKOS. Preliminary Report on Field Experiments to demonstrate Effectiveness of various Methods of Malaria Control. *Amer J Trop Med* 1947 Mar; 27 No 2 135-45

On the Atlantic Coast of tropical America where malaria is endemic and carried by *Anopheles albimanus* five towns were chosen for the comparative testing of malaria control measures in 1946 after surveys of the incidence of malaria had been made in the previous year. Control work actually started in December 1945 and the report covers the period up to 3rd April 1946 only, a time which does not include the transmission season of May to December.

The control procedures in the towns were (a) weekly dosage of S^N 7618 on a basis of 0.3 gm. weekly for an adult which reduced the parasite rate from 33 per cent to 6 per cent, (b) application of a 5 per cent solution of DDT at doses of 300 to 400 mgm/sq ft (10.6 to 14 oz/1000 sq ft) as a residual anopheline insecticide, (c) application of a 5 per cent solution of DDT as a larvicide from aircraft and (d) the use of drug S137 as a prophylactic.

As the report does not cover the transmission period it is not surprising that no significant reduction in incidence was produced by methods (b) and (c). Method (d) had not been started at the time of closure of the report.

The paper will be of interest as a background to a later report.

G Macdonald

GARNHAM P C C. Exoerythrocytic Schizogony in *Plasmodium kochi* Laveran. A Preliminary Note. *Trans Roy Soc Trop Med & Hyg* 1947 May; 40 No 5 719-22

In a post mortem search of the organs of 16 monkeys (*Cercopithecus*) showing *Plasmodium kochi* in the peripheral blood, the author working in Kenya found characteristic changes in the livers of 15.

These changes took the form of multiple white or translucent spots, more commonly on the surface of the organ. In diameter they reached a maximum of 2 mm. The translucent forms are cystic, and the fluid contains minute flakes which are in fact developmental forms of the parasite. Smears from these merocysts showed both merozoites and schizonts; the appearance and development of these are described. There is no pigment and the parasites do not

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The local tissue reaction begins with a polymorph invasion, which may result in complete response: if, however, the parasite survives, these are replaced by a layer of fibroblasts and giant cells; little of the cellular reaction remains around the mature cyst. It is suggested that each focus of cytomeres is produced by the multiplication of a sporozoite or merozoite: it seems likely that the merozoites of the mature cyst, being in close contact with liver tissue, escape into the circulation and become gametocytes.

The author has his belief that the liver foci are part of the cycle of *P. kochi* on the following grounds. (1) the only schizonts found in blood smears of heavily infected animals were of the *gallinaceum* type: in sections, cytomeres strongly resembling *Haemoproteus* were found, (2) no other blood protozoa were found in the monkeys, except a *Babesia* in one case, (3) the merocysts did not significantly resemble fungi and did not grow on Sabouraud's medium, (4) 7 monkeys which were repeatedly negative for malaria did not show the liver lesions described.

Efforts to confirm the identity of the parasite by transmission experiments have failed so far: but a slightly suggestive result was obtained by giving paludrine to an infected monkey in whose liver two spots had been detected at experimental operation: after 4 days of paludrine, the animal died and at autopsy, only one tiny spot was found.

The author found the parasite in 6 species of *Cercopithecus* in Kenya: in general it conforms closely with the original descriptions of *P. kochi* Laveran and with strains from West Africa, examined by the author in preparations provided by Dr Hawking.

The author notes that the type of schizogony seen is more akin to that of *Haemoproteus* than *Plasmodium*, but he considers that *kochi* should not be removed to the latter genus, which comprises parasites of non-mammalian nucleated blood with "*Halleridium*" gametocytes; and in any case, the later cystic stages which he has described are quite unlike anything hitherto described in the Haemosporidiidae.

Reference is made to the observation of LEVADITI and SCHOEN (*C. R. Soc. Biol.*, 1932, v. 109, 343) who described such liver bodies in a baboon; but they did not associate them with malaria and gave them the name *Hepalocystis simiae*.
H. J. O'D. Burke-Gaffney.

RIGDON, R. H. & ROSTORFER, H. H. Effect of Oxygen on *P. lophurae* Infected Ducks. *Proc. Soc. Exper. Biol. & Med.* 1946, Oct., v. 63, No. 1, 163-7.

RIGDON, R. H. & ROSTORFER, H. H. Blood Oxygen in Ducks with Malaria. *J. National Malaria Soc.* 1946, Dec., v. 5, No. 4, 253-62, 5 figs.

"1. The oxygen capacity of the blood is greatly reduced during *P. lophurae* infection in the duck. At the time of death, the blood may have only 20 per cent. of the normal oxygen capacity.

"2. During the course of the malarial infection in the duck a severe acidosis develops which also reduces the efficiency of the blood as an oxygen transporting medium.

"3. The young cells are not efficient oxygen carriers in comparison to normal adult red cells.

"4. Death of birds infected with *P. lophurae* is caused by failure of the blood to carry a sufficient amount of oxygen to support life."

RIGDON R H Effect of Vitamin A Deficiency on *Plasmodium lophurae*
Infection in Ducks J Infect Dis 1946 Nov-Dec. v 79 No 3 272-7
3 figs.

There is no evidence from this study to show that a vitamin A deficiency in ducks influences either the time that the peak of infection is reached or the degree of parasitemia produced by *Plasmodium lophurae*. This deficiency does not affect significantly the susceptibility of the duck to this infection as indicated by the degree of parasitemia at the time of death.

RIGDON R H & MARTIN H Effect of Insulin on *Plasmodium lophurae*
Infection in Ducks. Amer J Hyg 1947 Mar. v 45 No 2 185-90
3 figs. [15 refs.]

White Pekin ducks infected with *P. lophurae* do not show any significant differences in the course of the parasitemia when given enough insulin to produce a severe hypoglycemia and blindness as compared to noninsulin treated malarial infected ducks.

The rapid decrease in the number of parasites which occurs immediately following the peak of parasitemia apparently cannot be attributed to hypoglycemia.

In this experiment 30 per cent of the ducks with malaria died 40 per cent of those given only insulin died while 90 per cent of those given both malaria plasmodia and insulin died. It appears that the effects of hypoglycemia produced by both the insulin and a high degree of parasitemia are additive in producing death.

BLACKWATER FEVER.

FINDLAY G V & MARKSON J L Attempts to induce Blackwater Fever experimentally Ann Trop Med & Parasit 1947 May. v 41 No 1 22-5

It has been suggested that blackwater fever is due to sensitization an auto-antigen being produced by the action of the malaria parasite or parasite plus anti-malarial drug on the red cell. This autoantigen gives rise to an auto-antibody haemolysin which reacting with red cells in the presence of complement causes haemolysis. In support of this theory it is remarked that European troops rarely developed blackwater fever during the first nine months of residence in W. Africa this period presumably being necessary for sensitization. Among African troops the incidence of blackwater fever was low in 1941 and 1942 but gradually rose in 1943 1944 and 1945 although in African civilians the incidence of the disease showed no similar rise. The only difference between the African soldiers and civilians was that the former had been put under conditions where the chance of being bitten with infected anophelines was reduced. It is suggested that by this means the soldiers to some extent lost their immunity to malaria and that subsequent incidental infections resulted in a rise in the incidence of blackwater fever since these infections were with the same strains as those with which the soldiers had originally been infected. In the subsequent infections the strains reacted therefore as specific allergens. African troops transferred to India although similarly removed from the chance of being reinfected with W. African strains did not show a similar rise in the incidence of blackwater fever since their re-infections were with different strains of parasites. Slightly suggestive evidence in support of the hypothesis was obtained by experiments on patients convalescent from blackwater fever injections of

normal blood into such patients produced no reaction; but injections of blood from patients suffering from malaria caused by the local strain of parasites produced haemolysis in three out of six patients convalescing from their first attack of blackwater fever, while similar injections of the infected blood produced no haemolysis in normal persons.

F. Murgatroyd.

TRYPANOSOMIASIS.

VAN DEN BERGHE, L. Sur la présence d'acide pentosenucléique sous forme de grains de "volutine" dans les trypanosomes. [The Presence of Pentosenucleic Acid in the Form of Grains of "Volutin" in Trypanosomes.] *Acta Biol. Belgica*. 1942, v. 2, No. 4, 464-7, 2 figs.

PIERRON, A. Note sur le traitement de la trypanosomiase par injections intraveineuses d'arséniate d'argent. [The Treatment of Trypanosomiasis by Intravenous Injections of Silver Arsenate.] *C. R. Acad. Sci.* 1947, Jan. 13, v. 224, No. 2, 163-4.

The author, in Gabon, claims remarkable success with the use of silver arsenate given intravenously in cases of trypanosomiasis.

Claims of success include disappearance of parasites and symptoms, absence of intolerance to the drug, efficacy in arsenic-resistant cases, value in both early and central nervous infections and very small dosage.

However, the type of infection treated, the number of cases and the exact dosage of the drug are not stated, other than that the doses were nearly 100 times weaker than the usual trypanocides, so that this note is of little practical value until further information is forthcoming. H. J. O'D. Burke-Gaffney.

IKERJANI, O. The Antigenic Composition and the Effect of various Extracts of *Trypanosoma equiperdum* and *Trypanosoma lewisi* on the Leucocyte Pictura in Experimental Trypanosomiasis. *Amer. J. Hyg.* 1947, Mar., v. 45, No. 2, 144-9.

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LATIF, N. Therapeutically Active Stilbenes. *J. Roy. Egyptian Med. Ass.* 1947, May, v. 30, No. 5, 247-55. [17 refs.]

LEISHMANIASIS.

KIRK, R. & SATI, M. H. Observations on the Use of Sodium Antimony Gluconate (Sodium Stibogluconate) in the Treatment of Kala-Azar. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 14-21. [10 refs.]

In three series of cases of kala azar, all but two of the patients being in the Gedaref Civil Hospital, Sudan, treatment was given with sodium antimony gluconate (sodium stibogluconate), which is apparently identical with the Bayer preparation "solustibosan". The cases were unselected and presented

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Phlebotomus papatasi, *P. sergenti*, *P. caucasicus*, *P. chinensis*, *P. sergenti* var *alexandrin* and *P. graecorum*. The biotopes of sandflies sometimes serve both as breeding places and as habitats of the adult insects and sometimes only for some part of their life-cycle. By means of the precipitin reaction it was shown that *P. papatasi*, *P. sergenti*, *P. caucasicus* and *P. chinensis* have no special food preferences but feed on the blood of those animals which are more prevalent in a given locality and are more accessible to their bites. These sandflies are characterized by gonotrophic harmony, i.e. they require a single blood meal for the maturation of one batch of ova. From 30 to 36.6 per cent of the females pass through repeated gonotrophic cycles thus providing favourable conditions for the transmission of leishmaniasis by these species of sandflies.

C. A. Hoare

LEVITSKY, L. B. & SKADOVSKAYA, V. S. [On the Histopathology of Cutaneous Leishmaniasis.] *Ved. Parazit. & Parasitic Dis.* Moscow 1946, 15, No. 5, 73-81, 9 figs. [In Russian.]

This paper is devoted to a study of the pathogenesis of experimental cutaneous leishmaniasis and deals on the one hand with the behaviour of the parasites at various stages of the disease and on the other hand with the reactions of the host's tissues to the infection. A culture of *Leishmania tropica* from a human ulcer of the moist type (thus *Bulletin* 1944, 41, 331) was inoculated subcutaneously into the ears of mice and portions of the ear removed at different stages of development of the sore were fixed and examined in paraffin sections and stained by various methods. After having been introduced into the skin the leishmanias at first multiply intensely outside the host's cells. The host's organism responds by the usual inflammatory reaction. By diapedesis enormous numbers of neutrophil leucocytes migrate into the tissues followed later by lymphocytes and monocytes and by histiocytes from the surrounding connective tissue. The histiocytes are transformed into macrophages which engulf the parasites and these continue to multiply intracellularly. In addition to the macrophages the leishmanias may invade a variety of other cells such as neutrophils, lymphocytes, epithelial as well as muscle and cartilage cells. The host cells are lysed by the parasites which probably secrete a special exotoxin. During the infiltration stage (3-4 weeks after inoculation) the centre of the sore consists of disintegrated masses of tissues and free leishmanias while along the periphery they are intracellular. The leishmanias then begin to spread through the derma their penetration being effected in different ways through the lymph ducts by lysis of the tissues and invasion of its healthy parts and by the macrophages which pick up the parasites in the infiltration area and carry them to the periphery. In the nodular stage (2-3 months after inoculation) the host's tissues undergo more extensive lysis the parasites penetrate into the epithelium of the skin destroying the basement membrane as a result of which the entire epidermis disintegrates exposing the connective tissue and giving rise to an ulcer (4-4½ months after inoculation). In the nodular stage the majority of the parasites are extracellular and the phagocytes appear on a large scale. Since with them in the ulcerating stage antibodies appear on a large scale. Since about degeneration of the parasites is rarely observed it is thought that it does not play any special rôle the defence mechanism of the host depending chiefly on humoral factors. While the parasites are being destroyed there is an increase in the number of fibroblasts and a gradual formation of scar tissue. The mutual relations between the parasites and elements of the host's tissues are clear shown in the figures illustrating this paper.

C. A. Hoare

SAGHER, F. *Leishmania Vaccine Test in Leishmaniasis of the Skin (Oriental Sore). Quantitative Experiments.* *Arch. Dermat. & Syph.* 1947, May, v. 55, No. 5, 658-63, 1 chart.

It has been observed that, although the reaction to the intradermal injection of a leishmania vaccine is, generally speaking, specific, the reaction varies in intensity and is occasionally negative in a definite case of oriental sore. The author has therefore carried out a series of tests with graded dilutions of vaccine in a number of cases of oriental sore of various types.

His cases have been placed into three groups:—

(1) *Leishmaniasis nodosa*: duration of infection less than one year: histologically—chronic non-specific inflammation.

(2) *Leishmaniasis recidiva* [see DOSTROVSKY, this *Bulletin*, 1935, v. 32, 89]: duration of infection more than one year: histologically “tubercloid granulation”.

(3) Transition forms: over one year's duration.

The full-strength vaccine, made according to Dostrovsky's method [this *Bulletin*, 1936, v. 33, 21] contained 1,000,000 leishmaniae per ml. It was used at full strength and in dilutions from 1 in 10 to 1 in 10,000,000. Thus, 0.1 ml. of the first dilution contained 10,000 leishmaniae, and 0.1 ml. of the last two only a fraction of 1 leishmania. The serial dilutions were injected intradermally and observed from 48 hours to a week later. Control injections with tuberculin and simple 0.5 per cent. solution of phenol were also given. A positive reaction varied in diameter from 5 to 15 mm.

The test was carried out in 84 cases of oriental sore and in 72 controls, mostly patients with other skin diseases. It was possible to follow the results in only 62 cases of oriental sore.

In 38 cases of *leishmaniasis nodosa* there was a positive reaction at moderate dilutions (1 in 100 to 1 in 10,000) in 34, and 4 showed a higher sensitivity (to 1 in 100,000 to 1 in 1,000,000). In 20 cases of *leishmaniasis recidiva*, there was a negative reaction in one and a low reaction (to undiluted or 1 in 10 vaccine) in 3, a moderate response in 5, and a high degree of sensitivity (including a reaction to 1 in 10,000,000 in 2 cases) in 11. The 4 transition forms all showed a high degree of sensitivity.

It was thus concluded that the recurrent types of leishmaniasis have “a more pronounced allergic component.”

There was no parallelism between the number and severity of the lesions and the intradermal reactions.

L. E. Napier.

PIERS, F. *Mucocutaneous Leishmaniasis in Kenya (with a Note on Penicillin Treatment).* *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, May, v. 40, No. 5, 713-18, 2 figs. on 1 pl. [23 refs.]

Leishmaniasis was rare in East Africa before the war. African troops engaged in Abyssinia often contracted kala azar [this *Bulletin*, 1942, v. 39, 608, 746; *ibid.*, 1944, v. 41, 17, 831], and cutaneous types of leishmaniasis were also observed [*ibid.*, 1943, v. 40, 229; 1944, v. 41, 831]. In Kenya, the Northern Frontier District was the only recognized endemic area of leishmaniasis. In the case now reported and in five cases of kala azar as well as in two cases reported by WRIGHT [*East African Med. J.*, 1943, v. 20, 19] the infection appears to have been contracted in Central Kenya in the Kamba reserve near Kitui. It seems uncertain whether a new focus of infection has appeared south of the Equator or whether an old focus is now being recognized for the first time. If the former is the case, it is easy to understand how the movements of troops during the war might have been responsible.

The patient was a male Nkamba aged 35. He was in a poor state of nutrition but there was no evidence of systemic infection. Neither spleen nor liver was enlarged. He was disfigured by a diffuse swelling of the upper lip and nose. The skin was deeply infiltrated and showed erosions from which there was a sero-purulent discharge. A polypus like mass protruded from and distended the right nostril. The mucous membrane of the nose was swollen partly eroded and bled easily. The mucous membranes of the mouth and pharynx were not involved and there was only slight glandular enlargement. Smears from the surface showed only polynuclear cells and cocci but in the puncture material macrophages crowded with leishmania were found. Sternal puncture showed no abnormality and the blood count was materially normal.

A biopsy from the right side of the upper lip showed the following —

The epidermis is covered by loose parakeratotic masses the spaces between which are filled by fibrin and contain many polynuclear cells.

The rete Malpighi shows marked intercellular (spongiosis) and intracellular oedema and is in most places reduced to five to six layers of cells. The rete pegs are flattened out but in some places irregular epithelial proliferation into the corium is notable (acanthosis). Polynuclear leucocytes are frequently encountered in the intercellular space. In one instance a large macrophage cell containing numerous leishmania is seen lying in the epidermis.

The corium is completely replaced by a diffus granulation tissue rich in cells and without any signs of tuberculous structure. It consists mainly of histiocytes, macrophages, plasma cells and round cells. Polynuclear cells are rare. The histiocytes particularly near the epidermis are packed with enormous masses of leishmania. There are many apparently newly formed capillaries within the granuloma. In some of the larger vessels of the deeper layers of the corium endothelial proliferation is seen.

The appendages of the skin are in an advanced state of disintegration. Fragments of hair follicles, sebaceous glands and coil glands are found in the depths of the corium. They seem to be no longer connected with the epidermis. The tissue around these residues contains sometimes giant cells of the Langerhans type.

Penicillin (400 000 units in five days) produced a distinct but not dramatic improvement. Later urea stibamine was given intravenously in doses of 0.1 gm at intervals of 3 days (unusually small doses) for an unstated period. Some further improvement was effected but the patient decided to leave the hospital.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

STIEVERS O. The Weil-Felix Reaction in Typhus Fever. *Acta Path et Micro Scandinavica* 1945, v. 22, No 3, 238-47 [17 refs.]

The author describes the results obtained in a large series of Weil-Felix tests in which suspensions of living *Proteus O119* were used after incubation for two hours at 37°C and standing overnight at room temperature. He suggests the desirability of adopting an internationally agreed standardized technique.

His results from 1 172 tests of sera from 297 typhus patients corresponded generally with those obtained by other workers. In tests carried out on sera of 1 903 patients whose blood had been sent for the Widal test from places where there was no possible contact with typhus.

patients he found the following positive reactions:—97 at 1-80; 25 at 1-160; 7 at 1-320; and 5 at 1-640 to 1-5,120. He emphasizes the necessity for carrying out simultaneous salmonella-agglutination tests in view of the strong co-agglutination reactions that may occur in such cases and for repeated Weil-Felix tests in all cases.

The survey of these and other findings "supports the reliability of the proteus reaction."

John W. D. Megaw.

GIROUD, P. & JADIN, J. Phases maxima des anticorps spécifiques au cours d'une rickettsiose déterminée. [Phases of Maximum Activity of Specific Antibodies in the Course of Experimental Rickettsial Infection.] *C.R. Soc. Biol.* 1947, Mar, v. 141, Nos. 5/6, 235-7.

Using strains of epidemic- and murine-typhus rickettsiae as antigens in the authors found that in undoubted cases of titre of the serum might at one stage of the the same, with both antigens, whereas at a later stage the epidemic titre became much higher than the murine.

With the use of rabbits inoculated by the intraperitoneal route with large doses of epidemic and murine rickettsiae and their toxins, it was found that much higher than those the titres were much again became much

higher than the heterologous.

The authors conclude that during an attack of typhus fever the antibodies have a non-specific phase, which is preceded and followed by a specific phase; they regard the early stage of the illness and the stage following defervescence as the most favourable for carrying out the agglutination test.

John W. D. Megaw.

STEINER, F. Hautproben mit Fleckfieberimpfstoffen. [Dermal Tests with Typhus Vaccines.] *Klin. Woch.* 1944, July, v. 23, Nos. 27/30, 277-8.

The author confirms the conclusion reached by Bischoff that positive local reactions occurring after intradermal injections of Weigl's vaccine into persons who had previously been vaccinated with the same type of vaccine may be due to supersensitiveness to the albumins derived from the bodies of the lice used in preparing the vaccine. [See this *Bulletin*, 1945, v. 42, 198.]

Among 36 persons who had been vaccinated with Weigl's vaccine, only two gave completely negative reactions when the test was carried out with the same vaccine. On the other hand, among 48 persons who had been vaccinated in the same way, 26 were completely negative to injections of a yolk-sac vaccine made by the Behring firm.

The value of the test in diagnosis is regarded as unproved.

John W. D. Megaw.

VON BORMANN, F. & PREUSS, H. Eine Schnellmethode zur Fleckfieberdiagnose. [A Rapid Test for Typhus Fever.] *Klin. Woch.* 1944, July, v. 23, Nos. 27/30, 276-7.

Yet another of the rapid slide tests, of interest only to those experimenting with such tests.

John W. D. Megaw.

MENYASZ, E. & NICOLAS, E. Valeur clinique du changement colorique de l'éruption au cours de l'évolution du typhus exanthématique [The Clinical Significance of Changes in the Colour of the Eruption during Attacks of Exanthematic Typhus.] *Riv Istituto Sieroterap Ital Sez Prima* 1947, Apr-June, v 23, No 2, 81-9. English summary

The authors made a special study of the eruption occurring in typhus

When purpuric or ecchymotic spots became darker in colour and more numerous it was found that after an interval of one or two days the condition of the patients greatly deteriorated or dangerous complications occurred. These changes in the rash were of great significance from the point of view of prognosis, they occurred either during the febrile stage or after defervescence.

John W D Megaw

HAAGN, E. Bemerkungen zu dem Aufsatz "Typhus fieberfallen" (Dr V Lachnit in Nr 1947, July 19, v 97 Nos 28/29 329)

The author bases his remarks on a study of 38 cases of typhus fever, of which five were fatal, seen between November 1941 and February 1942. [See this *Bulletin*, 1947, v 44, 704.]

Two of the patients had been inoculated with Weigl's vaccine during the incubation period, one of these died the other had a very severe attack, from which he recovered only because of his youth and previous fitness.

A firm belief is expressed in the value of full doses of strophanthin early in the illness, and also of calcium given intravenously as soon as possible after the onset. It is stated that after the latter line of treatment was adopted, no further deaths occurred, but the number of cases so treated is not mentioned.

John W D Megaw

SOPER F L, DAVIS W A, MARKHAM, F S & RIEHL L A. Typhus Fever in Italy, 1943-1945, and its Control with Louse Powder. *Amer J Hyg* 1947, May, v 45, No 3, 305-34, 16 figs (8 on 4 pls)

Although this paper deals only with one epidemic it can rightly be regarded as a monograph on the modern method of control of louse borne infections by insecticide powders.

The authors were members of the typhus team of the Rockefeller Foundation Health Commission which played a leading part in the disinfecting operations in and round Naples from December 9th 1943, when the epidemic was beginning to assume alarming proportions. The peak period was reached in the week ending December 26th, in which 224 cases occurred in Naples.

The epidemic and the remarkable success that followed the measures of control have already been described by several authors [see, for example, this *Bulletin* 1946, v 43, 638-9] but the present report contains a great deal of additional information with regard to the methods employed.

A few of the many points of interest in the paper are as follows:—The powder 'MYL' which contained pyrethrum, was developed by a group of workers of the U S A Department of Agriculture in 1942, and early in 1943 the U S A Typhus Commission found that two applications at a 14-day interval reduced louse infestation to a low level.

In 1943, in Algeria, SOPER and his co workers developed the new technique by which the powder is applied to persons and their clothing without undressing. The most suitable types of hand-dusting gun were found to be the

Dobbins "Superbuilt" No. 133, and the Hudson "Admiral" No. 765. MYL powder, which alone was used during the early stage of the epidemic, seems to have been as effective as the 10 per cent. DDT powder, which was also used to a large extent when it became available. One pound of DDT powder was enough to dust 15-20 persons. The method of application is fully described with the help of eight clear illustrations. Disinfestation of contacts and neighbours—"spot dusting"—is believed to have played an important part in arresting the epidemic before the later adoption of "mass dusting" of the whole population could have become effective. More than three million dustings were carried out during and after the epidemic; in the week ending January 16th, 435,721 persons were dusted.

The paper must be read by all who are concerned with the control of louse-borne diseases.

John W. D. Megaw.

JAME, L. & JUDE, A. La vaccination contre le typhus exanthématique au cours de l'épidémie d'Algérie de 1941-1943. [Anti-Typhus Vaccination during the 1941-1943 Epidemic in Algeria.] *Schweiz. med. Woch.* 1947, May 31, v. 77, Nos. 22/23, 589-91.

No new work of note is recorded.

RAYNAL, J. H. Le dépistage du typhus exanthématique dans la population murine de Chang-Hai. [The Detection of Typhus among the Rat Population of Shanghai.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 3/4, 93-110.

The author states that in Shanghai the murine nature of the typhus infection in man and its origin from infection among local rats are now "well established." In the present study, the sera of all the rats captured in the French Concession were subjected to Weil-Felix tests, and the occurrence of titres of 1-100 or over was regarded as evidence that the rats had been attacked during the preceding 10 to 20 days.

In a period of 56 months, from late November 1940, and the end of July 1945, 3,388 rats were examined, and of these 211 (6.2 per cent.) were positive at 1-100 or over. From 1941 till 1945 the yearly percentages of positive reactions were 7.1; 10.3; 5.4; 4.4; and 2.5. The corresponding number of positive Weil-Felix reactions observed in human sera during these years at the local Pasteur Institute were: 131; 301; 99; 73; and 23.

It was impossible to find room for the detailed statistics in the paper, but the occurrence of ephemeral epizootic outbreaks among rats is shown by the following figures, which are percentages of positive reactions observed among the rats captured during 10-day periods at the times stated. In 1941, there were two high peaks, one of 40 in June and one of 23 in August. In 1942 there was a severe outbreak with a high peak of 60 in early April, another outbreak reaching 35 in September, and a third reaching 26 in November. The author states that afterwards there were practically no important outbreak among rats, but he mentions the following peaks as occurring:—In 1943, one of 18 in April, and one of 22.5 in July; in 1944, one of 14 in early March and one of 23 in August; in 1945 there was a peak of 20 in early July.

BECK, M. Dorothy & VAN ALLEN, Alwine. Typhus Fever in California, 1916-1945, Inclusive. An Epidemiologic and Field Laboratory Study. *Amer. J. Hyg.* 1947, May, v. 45, No. 3, 335-54, 1 fig. [39 refs.]

In accordance with the usage customary among U.S.A. workers the author employ the term "typhus fever" as including murine typhus, but not the tick-borne rickettsial fever or fevers which elsewhere are generally regarded as belonging to the typhus group.

A detailed analysis is given of all the cases of typhus fever reported in California. Apart from one epidemic of louse-borne typhus in which 32 cases occurred among Mexican labourers in 1916-17 the disease has conformed to the murine-typhus pattern in its seasonal and place distribution. Between 1921 and 1924 the yearly number of cases ranged from 6 to 18; from 1925 to 1935 not more than four cases were reported in any year; from 1936 onwards the incidence has increased—in 1944 there were 44 cases and in 1945 there were 62.

Cases have been reported from only five counties out of the 16 in the State. In these five counties field surveys have revealed that *Rattus norvegicus*, *R. rattus*, *R. alexandrinus* and *Mus musculus* were natural reservoirs of infection. Ground squirrels, though not found infected in natural conditions, were shown by experiment to be potential reservoirs.

Among large numbers of rats captured at random in the 11 non-endemic counties, only one was found to harbour infection. John W. D. Megaw.

HILL, E. L. & INGRAHAM, S. C. A Study of Murine Typhus Fever in Coffee County, Alabama. *Pub Health Rep. Wash.* 1947, June 13, 62, No. 24, 875-81.

The authors describe a study of murine typhus in the predominantly rural area of Coffee County, Alabama, which lies between 31° and 32° north latitude.

During 1943 the officially reported cases numbered 61, but in a house-to-house survey it was found that 211 persons stated that they had been attacked during the year. Sera of 177 persons belonging to the latter group were examined by complement fixation and Weil-Felix tests and 137 were regarded as positive on the strength of complement fixation titres of 1-16 and over or of Weil-Felix titres of 1/60 and over. In 100 of the cases both reactions were positive. Two deaths from the disease occurred during the year.

The incidence rate was 428 per 100,000; it was approximately the same in rural and urban localities and infection was obviously associated with dusty occupations in rat-infested places.

Positive complement fixation reactions were obtained in 42 per cent. of 431 rats caught on farms; the percentage of positives was 50 among the 228 rats found infested by *Yenopsylla cheopis* and 32.5 among the 203 that were not infested. John W. D. Megaw.

DIERCKS, F. H. & TIBBS, R. O. A Rapid Method for the Staining of *Rickettsia orientalis*. *J. Bacteriology* 1947, Apr., 53, No. 4, 479-80.

Giemsa's and other stains have not proved entirely satisfactory for the staining of *Rickettsia orientalis* in yolk sac tissues, particularly because of the

stain differentiation, intensity of staining, stability of the solution and

For use the tetrachrome stain prepared according to the manufacturer's directions is prepared as a stock; the optimum pH is 6.5 to 7.0. Air-dried

yolk-sac smears are fixed in absolute methyl alcohol for 3 to 5 minutes. The working solution is prepared by adding 4 to 5 cc. of the stock solution to 75 cc. of distilled water. The slides are transferred from the fixative to the stain in Coplin jars with gentle agitation and stained for 15 to 20 minutes. The preparations are cleared in absolute acetone, blotted dry and examined under oil-immersion, a blue ground-glass filter being used.

Staining is uniform and is retained for at least 12 months. The background is pinkish, the rickettsiae stain a characteristic dull blue, blood cells are differentially stained and any bacteria present show an intense blue colour and are relatively large.

The advantages of the tetrachrome method are (1) ready availability and stability, (2) fixing reduces the chance of accidental infection from the slides, (3) the staining time is short, and allows for three times as many slides to be dealt with daily as could be handled when Giemsa's stain is used, (4) simplicity and reliability make the method useful for workers inexperienced in staining rickettsiae.

The disadvantages are that the stain is not so intense as Giemsa and is not satisfactory for morphological or photographic studies; also, consistent results are not obtained in staining rickettsiae in animal's tissues, e.g. spleen and liver smear.

H. J. O'D. Burke-Gaffney.

TULLIS, J. L., GERSH, I., JENNEY, Elizabeth, McLIMANS, W. F. & VINSON, J. W. Tissue Pathology of Experimental Tsutsugamushi Disease (Scrub Typhus) in Swiss Mice and *Macacus rhesus* Monkeys and the Report of One Human Case acquired in the Laboratory. *Amer. J. Trop. Med.* 1947, May, v. 27, No. 3, 245-57, 1 text fig. & 50 figs. on 6 pls. [11 refs.]

The authors describe the histological changes found in the following infections with the Karp strain of *Rickettsia orientalis*: (1) 45 mice, each of which was inoculated intraperitoneally with 1,000 m.i.d. of yolk-sac suspension; (2) 10 monkeys, inoculated intradermally, intravenously and intraperitoneally, with yolk-sac suspension, and (3) a man who died on the 17th day of an illness resulting from laboratory infection, presumably acquired through inhalation of

the infection, which caused an illness lasting about 15 days.

The paper is illustrated by 50 excellent photomicrographs reproduced at a magnification of 60 diameters.

The changes observed were similar to those recorded by other workers; they consisted of lymphocyte-macrophage-plasma cell proliferation followed by invasion of mesenchymal tissues by these cells, which were carried by the blood stream.

Among mice, the spleen was the first organ to show signs of reaction; lymphocytes from this and from the lymph nodes gave rise to perivascular infiltrations and collections of lymphocytes in the various organs.

The authors emphasize the absence of destructive changes in the vascular endothelium, which showed only swelling, hypertrophy and "stickiness", but rarely to a degree causing tissue necrosis such as occurs in Rocky Mountain spotted fever and epidemic typhus, in which "destruction of the vascular endothelium,

[The authors state that the damage is a universal feature of epidemic typhus, and that it is universally absent in scrub typhus. Among the different strains of rickettsiae occurring in each of these three diseases there is a

[October 1947]

range of variation in virulence and correspondingly in the intensity of the tissue changes observed in various outbreaks. Other workers are by no means unanimous in regarding the histological changes occurring in scrub typhus as being essentially different from those seen in epidemic typhus and Rocky Mountain spotted fever. In this connexion the article by SETTLE *et al* [see this Bulletin 1946 v 43 27] deserves attention.]

John H. D. Megaw

TEMPLETON W. C. Scrub Typhus in Malaya. J. Roy. Army Med Corps. 1947 Apr v 88 No 4 153-61 1 chart

During the period October 1945 to February 1946 the author studied 56 cases of scrub typhus all but one of which occurred among troops stationed in or near Kuala Lumpur where FLETCHER LEWTHWAITE and others had investigated the disease.

The symptomatology as described in the paper conformed to the recognized pattern there were three deaths.

The Kahn test was carried out on some patients the reaction was never more than doubtfully positive and was always negative after defervescence. Four cases of urban typhus occurred during the period. Clinically these could not be distinguished from cases of scrub typhus without eschar except by their relative mildness and by the Weil-Felix test. In all four the OXA titre showed a rise—to 1-320 1-320 1-160 and 1-40 respectively the corresponding OXA 19 titres were 1-1280 in the first three and 1-640 in the fourth case.

In 10 severe or complicated cases of scrub typhus penicillin was given usually in doses of 40 000 units every three hours up to a total of 1 600 000 units. Little or no improvement was observed but the anticipated deterioration of condition did not occur. The duration of the fever was not affected. One of the patients who was treated from the 8th day with doses of 20 000 units up to a total of 900 000 units died on the 17th day after repeated bouts of haematemesis the gastric mucosa after death was found to have numerous haemorrhagic points.

John H. D. Megaw

BAIER J. A. A Rickettsial Infection in Canadian Voles. J. Exper. Med. 1946 July 1 v 84 No 1 37-50 2 figs on 1 pl.

The author reports the very interesting discovery that many of the voles (*Microtus pennsylvanicus pennsylvanicus*) in Grosse Isle are infected by a rickettsia which seems to be related to the hard strain of *Rickettsia orientalis* and which is probably transmitted from vole to vole by the mite *Trombicula microti*.

Grosse Isle is in the St. Lawrence River 29 miles down stream from Quebec City and is four miles distant from the nearest shore.

Yolk sac cultures of suspensions of enlarged or normal spleens of some of the voles were found to contain rickettsiae after one or more serial passages.

Most of the infected embryos died five to seven days after inoculation. With yolk sac material obtained after 10 to 15 serial passages mice hamsters rats and guinea-pigs were successfully inoculated by the intraperitoneal route.

Successful inoculation was indicated by the occurrence of rickettsiae in yolk sac cultures of suspensions of the spleen or blood of the animals. Two monkeys were inoculated by the same route but rickettsiae could not be recovered from their spleens.

Direct transmission of infection from animal to animal by infected blood was successful only with hamsters.

With the assistance of Dr. Norman Topping a study was made of the relationship between the organisms and known strains of rickettsiae.

Morphologically, the closest relationship was with the Karp strain of *Rickettsia orientalis*. Guinea-pigs inoculated with the vole strain showed no immunity against Rocky Mountain spotted fever, epidemic typhus, murine typhus, or the Seerangayee strain of scrub typhus; but mice inoculated with suitable doses of the vole strain were found immune to lethal doses of the Karp strain of scrub typhus.

Sera of two monkeys inoculated with the Karp strain gave positive complement-fixation reactions with antigens of the Karp and vole strains at titres of 1-256 and 1-512. However, two other monkeys inoculated with the vole strain reacted, at titres of 1-64 and 1-256 against normal-yolk-sac antigen, and at titres of 1-16 and 1-256 against both the Karp and the vole strain of antigen. [This is a striking example of a non-specific fixation reaction.]

Sera of guinea-pigs inoculated with the Karp and vole strains gave positive reactions at titres of 1-8 to 1-64 against the homologous antigens, but negative reactions against the heterologous antigens.

Voies were numerous on the island; they harboured seven species of fleas, one of a non-blood-sucking louse, three of mites, of which only one—*Trombicula microti*—was blood sucking; and one of a tick (*Ixodes sp.*).

From a hamster inoculated with a suspension made from a pool of 20 mites (*T. microti*) taken from two voles, rickettsiae similar in appearance to the vole strain were recovered by yolk-sac culture.

An attempt to transmit infection from an infected to a clean hamster by fleas (*Nosopsyllus* [= *Ceratophyllus*] *fasciatus*) was unsuccessful.

The conclusions reached are that voles on the island have "an inapparent infection due to a rickettsia that may be related to the rickettsia of scrub typhus" and that mites "have a probable part in the epidemiology."

The author speculates on the possibility that the strain may have resulted from the modification of *R. prowazeki* through prolonged sojourn in a mite-vole environment, or that scrub typhus itself may have been introduced into the island. Apart from these possibilities, he concludes that a new species must be added to the rickettsia family.

[The last suggestion seems to be the most likely; if it is confirmed the organism would suitably be called *Rickettsia bakeri*.] John W. D. Megaw.

HUEBNER, R. J., JELLISON, W. L. & ARMSTRONG, C. Rickettsialpox—a Newly Recognized Rickettsial Disease. V. Recovery of *Rickettsia akari* from a House Mouse (*Mus musculus*). *Pub. Health Rep. Wash.* 1947, May 30, v. 62, No. 22, 777-80.

The authors have recovered *Rickettsia akari* from naturally infected house mice (*Mus musculus*) trapped at the site of an outbreak of rickettsialpox [see this *Bulletin*, 1947, v. 44, 411].

Previous attempts to isolate the rickettsia of rickettsialpox from mice were frustrated by the occurrence of choriomeningitis infection among the mice, so that guinea-pigs and Swiss mice used in inoculation experiments died of this infection.

This complication was overcome by immunizing Swiss mice against the virus of choriomeningitis and later inoculating them with suspensions of liver and spleen of three house mice trapped in the infected houses.

Rickettsiae identical with those recovered from human patients and were isolated. Details are given of the cross-immunity and fixation tests by which the identity of the mouse strains was established.

Mice from the infected homes were shown by direct challenge and by complement fixation tests to be immune against the disease.
The findings show that the house mouse is a natural reservoir of infection and suggest methods for the investigation of suspected foci of the disease
John W D Megaw

PREOBRAZHENSKI A A (Tick-borne Fever in the Maritime Province) Med Parasit & Parasitic Dis Moscow 1946 v 15 No 4 53-62 6 figs [In Russian]

The author gives a detailed account of a form of tick borne typhus fever occurring in the Soviet Far East based on recent epidemiological observations. The disease which is transmitted by *Dermacentor sylvaticus* and *Haemaphysalis concinna* has a seasonal distribution its incidence gradually rising from April to a maximum in May and falling to a minimum in June while in July and August only isolated sporadic cases are encountered. The foci of the disease are characterized by the presence of bush vegetation representing the favourite haunts of the ticks especially the first named species. These ticks first appear towards the end of March reaching considerable numbers in April and May and declining in June after which only single specimens are encountered. The seasonal fluctuation in the numbers and activity of *D sylvaticus* thus corresponds to the seasonal variation in the bites of this tick are the hairy parts of the head neck shoulders genitals and shins. The meteorological factors affecting the activity of the vector have an indirect effect upon the dynamics of the incidence of the disease. Thus a fall in the temperature of the air and an increase in the number of rainy days are followed by a decline in the incidence and *vice versa* a rise in the temperature and reduction of rainfall bring about an increase in the incidence. The Weil Felix reaction in this type of fever is especially sensitive with *Proteus OX19* which gives a positive reaction in 100 per cent of cases during the third week in dilutions not lower than 1:160. It is recommended as a supplementary diagnostic method from the second week of the disease
C A Hoare

BLANC G MARTIN L A & MAURICE A Le Mènon (*Ménonnes shawi*) de la région de Goulmine est un réservoir de virus de la Q fever marocaine [The Gerbille *Ménonnes shawi* as a Reservoir of Q Fever Infection in the Goulmine Region of Morocco] C R Acad Sci 1947 June 9 v 224 No 23 1673-4

In Morocco natural infection of *Hyalomma sanguineum* with *Rickettsia burneti* has been found the authors have isolated four strains from these ticks in the Goulmine area while most of these ticks were found on goats and sheep one batch came from the neighbourhood of burrows inhabited by the gerbille *Ménonnes shawi*.

The authors were able to infect a goat easily and the animal developed a severe febrile illness during which the rickettsiae could be recovered from the blood. Further work on the possible rôle of the goat as a reservoir of *R burneti* is in progress.

The fact that *Hyalomma* were found near the burrows of *M shawi* seemed to be significant but the authors failed to obtain evidence of infection in nymphs of this species or of *Rhipicephalus* caught on the gerbilles. Nevertheless two of three lots of spleens from these animals were found to be naturally infected and this infection was established experimentally in a guinea pig.

Cross immunity could be demonstrated between the two strains isolated from the gerbille and strains from *Hyalomma*.

The authors consider that, in the Goulimine region, *Meriones shawi* is an important reservoir of Q fever infection. H. J. O'D. Burke-Gaffney.

DENGUE AND ALLIED FEVERS.

BLACK, W. C., FLORIO, L. & STEWART, Mabel O. A Histologic Study of the Reaction in the Hamster Spleen produced by the Virus of Colorado Tick Fever. *Amer. J. Path.* 1947, Mar., v. 23, No. 2, 217-25, 2 figs. on 1 pl. & 1 text fig.

The authors describe a characteristic, but not necessarily pathognomonic, reaction which occurs in the spleen of hamsters inoculated intraperitoneally with the virus of Colorado Tick Fever.

The reaction reached its height on the third day after inoculation, and was observed in 79.3 per cent. of 520 infected hamsters; it consisted of (a) a reduction in the number of lymphoid cells in the centre of the follicles, (b) the appearance of large mononuclear cells, polymorphonuclear leucocytes, and erythrocytes, throughout the follicles, and (c) a partial or complete disappearance of the well-defined margins of the follicles.

The paper is illustrated by two photomicrographs, one of an affected, and one of a normal, spleen

John W. D. Megaw.

PLAGUE.

WAYSON, N. E. Plague-Field Surveys in Western United States during Ten Years (1936-1945). *Pub. Health Rep.* Wash. 1947, May 30, v. 62, No. 22, 780-91.

During these 10 years of survey, more than 595,097 rodents and 1,186,777 fleas have been examined with 461 positive results. The surveys have been made in each of 487 counties out of a total of 644 counties between the Pacific Coast and the 100th meridian, and the Canadian and Mexican boundaries in 17 Western States. In California, collections of infected animals and parasites were obtained from 33 out of 58 counties between 1908 and 1945.

Many important generalizations and also much detail are enshrined in this record.

Under experimental conditions, the development of the condition within the flea which effects or aids in transmission varies within wide limits of time, from 5 to 10 days in *Xenopsylla cheopis* to 15 days in *Nosopsyllus fasciatus* and even 3 months in other species. A degree of flea-host selectivity has been noted, such as might be a retarding factor in dissemination from an animal of one genus to that of another.

They will feed on hosts of species but "all of the

Pasteurella pestis . . . exhibits consistent characteristics which do not permit of differentiation of strains recovered from rats, from other rodents, from fleas or from man." One infectious flea, it seems, is capable of transmitting the disease "to each of several animals on which it feeds, though it may not infect all of them." A question which has constantly recurred to the epidemiologist is that of the carry-over of plague from the

recrudescence. Much work has been done in American laboratories with hibernating animals as the test. No evidence is forthcoming apparently to substantiate the view that a rodent carrier of subacute or chronic plague is a factor in the perpetuation of the enzootic. Nevertheless fleas cannot be infected except on animals presenting a marked degree of bacteraemia and it would seem to follow that acute recrudescence in the carrier of the quiescent disease was a necessary antecedent to carry-over of the disease. This is difficult to prove or to examine. A general conclusion is that many factors still require examination to explain the spread of sylvatic plague and that an element of chance enters into the fulfilment of conditions favourable to the progressive spread of the disease.

W. F. Harvey

GIRARD G. & SANDOR G. La nature de la toxine pesteuse [Nature of Plague Toxin] C R Acad Sci 1947 Apr 9 v 224 No 14 1078-80

Endotoxins were generally in the past characterized as nucleoproteins. Chemical analysis of microbial antigens has progressed considerably and the authors refer especially to the work of Borivn who described a glucolipid complex in the endotoxins of many Gram negative pathogenic organisms which was absent from the true exotoxins. They have not however been able to demonstrate this complex in either virulent or avirulent plague bacilli. In their present work they have compared serum of horses hyperimmunized by intravenous injection of formal toxin (anatoxin) with that of horses similarly injected with avirulent but toxic bacilli. Fractionation of the sera furnished euglobulins I and II representing bacterial precipitating and protective antibodies and pseudoglobulin representing true antitoxin. The distribution of the antibodies among the three fractions was absolutely identical in the two types of sera mostly in euglobulin I and to a very slight extent in the pseudoglobulin. Their conclusion is that (1) a principle of protein nature is attached to the bacillary bodies (2) it diffuses into liquid culture media (3) it accounts for most of the pathogenic and immunizing characters of the plague bacillus (4) it may be injected as bacilli or dissolved and (5) thus there is demonstrated the complete divergence between true exotoxins and the so called endotoxins.

W. F. Harvey

RAMON G. GIRARD G. & RICHOU R. De l'influence sur la toxine pesteuse des filtrats de culture de *B. subtilis* de *Penicillium notatum* et *Actinomyces griseus* [Influence on Plague Toxin of Filtrates from Cultures of *B. subtilis*, *Penicillium notatum* and *Actinomyces griseus*] C R Acad Sci 1947 May 5 v 224 No 18 1259-61

The authors have previously shown (Bulletin of Hygiene 1946 v 21 693) that filtrates of *B. subtilis* cultures may alter and finally destroy the exotoxin of certain bacteria and they subsequently demonstrated a like capacity for filtrates of *Penicillium notatum* and *Actinomyces griseus*. They have now studied the effect of such filtrates on plague toxin in view of its immunological differences from the true exotoxins. It is shown that in toxicity experiments on mice which are described it is shown that a single filtrate of *B. subtilis* which had a titre antidotique of 450 units per ml alone had any appreciable effect on plague toxin one of three mice survived and the other two died after an interval. The action was therefore not due to the same filtrate was able to destroy large doses of staphylococcal diphtheria toxin in 24 hours. The authors conclude that plague toxin also differs from the true exotoxin in its behaviour towards filtrates of microbial antagonists.

H. J. O. D. Burke-Ga

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

DE BRUYN, P. P. H. Theories of Amoeboid Movement. *Quart. Rev. Biol.* 1947, Mar., v. 22, No. 1, 1-24, 10 figs. [Numerous refs.]

HILL, K. R. Laboratory Diagnosis of Intestinal Amoebiasis. *Lancet.* 1947, June 28, 903-6.

The purpose of this paper is to supplement the often brief accounts of the laboratory diagnosis of intestinal amoebiasis contained in textbooks. It is based on the author's experience in West Africa Command and on notes compiled by the former assistant directors of pathology there, Lieut.-Colonels B. G. MAEGRAITH and G. T. L. ARCHER. The resulting paper contains a wealth of practical detail which will be invaluable to the pathologist in Britain and the newly-arrived medical officer in the Tropics; and, indeed, their more experienced tropical colleagues will equally profit from it.

The paper is entirely practical and should be studied closely in the original; but a number of features merit special note. In discussing acute intestinal amoebiasis, the author stresses the importance of careful collection and naked-eye inspection of material and of skilful selecting of the most suitable specimens. He rightly notes the great value of preliminary examination of specimens with a low-power objective; he disposes of the belief that there is a typical amoebic exudate; "an exudate is said to be 'amoebic' only when *Entamoeba histolytica* is found." The differentiation of amoebae in saline preparations is carefully treated and the author makes the timely reminder that vegetative forms of *E. histolytica* should never be diagnosed unless the amoebae are progressively motile and contain ingested red cells. The non-pathogenic species most likely to cause difficulty is *Dientamoeba fragilis*, which, like *E. histolytica*, produces finger-like pseudopodia explosively; but these may be multiple, producing a stellate appearance, the ends sometimes become spherical and the resting amoeba becomes perfectly circular, all features which are absent in the case of *E. histolytica*. The common species is described and the difficulty in distinguishing *E. histolytica* in fresh preparations is pointed out. The vegetative forms may be revived by

means of a warm stage; otherwise they should not be reported, even provisionally, as *E. histolytica*. Aqueous smears are useful in differentiating *E. histolytica* from *D. fragilis*, since the mode of destruction of the latter (destruction occurs with all vegetative amoebae in 5-15 minutes) consists of explosive extrusion of the endoplasm, with an immediate sealing of the point of extrusion and the formation of a perfect transparent sphere; this does not occur with *E. histolytica* or other related forms; in the case of the former and *E. coli*, the endoplasm is never completely emptied after rupture. *E. nana* and *I. bütschlii* burst after distension.

Vital staining has been found successful and has shown motile amoebae as long as 7 hours after preparation at West African laboratory temperatures. The stain consists of two solutions:—

Solution A.

Brilliant cresyl blue	...	...	0.2 gm.
Sod. citrate	...	...	1.1 gm.
Sod. chloride	...	...	0.55 gm.
Hydrarg. perchlor. (sat. soln.)	0.1 cc.
Water	100 cc.

Solution B.

Eosin	1 gm.
Water	100 cc.

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For use a selected piece of mucus is emulsified on a slide in a mixture of equal loopfuls of solutions A and B and a coverslip applied. Active amoebae are easily picked out under the low power objective as blue green objects.

In connexion with the examination of material from chronic intestinal amoebiasis the author describes the use of saline and iodine preparations - multiple examinations of a specimen are more useful than concentration methods for cysts.

The author advocates the examination of specimens every second or third day for ten days in suspected cases in convalescence stools should be examined daily for a week before discharge then once a month for 3 months and thereafter every 6 months if necessary.

The differentiation of *E. histolytica* cysts from other varieties is discussed at length as is their differentiation from other objects such as *Blastocystis hominis*. aqueous preparations facilitate the recognition of the latter which rapidly loses its refractility.

The author boldly attacks the difficult problem of identifying cysts having four nuclei or less and describes at some length the nuclear and other features on which such identification may be based.

Finally mention is made of such adjuncts to diagnosis as provocative emetine and sigmoidoscopy and a routine method of the latter is described which includes the prior administration of saline enema followed by microscopic examination of the result before the actual sigmoidoscopy is performed.

[This extremely useful paper should be kept at hand by every laboratory worker who requires to be informed or refreshed upon the practical details of diagnosing intestinal amoebiasis.]

H J O D Burke Gaffney

SANTIAGO STEVENSON D MARTINEZ E C & HERNANDEZ MORALES F
Hepatic Complications of Amebiasis in Puerto Rico *Bol Asoc Med de Puerto Rico* 1947 Apr 39 No 4 123-33 5 figs [19 refs]

Infestation of the intestine with *E. histolytica* in Porto Rico is probably within the range quoted by CRAIG (*Amebiasis and Amebic Dysentery* 1934) who found an average of 11.6 per cent in surveys of continental U.S.A.

Clinical manifestations are however not so common the authors quote 46 cases in which *E. histolytica* were found in the stool although only in seven patients could symptoms be attributed to the presence of the parasite and only two were classed as amoebic dysentery. Furthermore only 0.45 per cent of 14,497 admissions to the medical wards of the Rodriguez General Hospital between 1942-1945 were diagnosed as clinical amoebiasis.

Whilst local medical opinion has considered that amoebic liver involvement is rare the authors suggest that it may be more frequent than has been suspected hitherto. They discuss the pathology, clinical features and diagnosis of amoebic hepatic lesions and distinguish the early frank hepatitis from the suppurative stage. They stress the value of X rays in diagnosis and of emetine in treatment.

They then give full case histories of five patients three with hepatitis and two with abscess seen in general hospitals in 3 years. Early diagnosis of amoebic hepatic involvement is stressed in view of the therapeutic implications. The most important factor in the diagnosis of amoebic hepatitis is the awareness of the occurrence of this complication.

H J O D Burke-Gaffney

AMALFITANO G Pseudocancro del ceco di origine amebica [Pseudocarcinoma of the Caecum of Amoebic Origin] *Riv di Biol Colon* Rome 1946 v 7 79-96 6 figs [15 refs]

The author lists nearly a score of conditions which may give rise to swelling in the right iliac fossa some extra intestinal as affections of the pelvis ovary.

etc.; others intra-intestinal as an aggregation of worms; others, again, of the wall of the bowel, such as carcinoma, tuberculosis, syphilis, actinomycosis, chronic colitis, "fibroplastic appendicitis" and amoebiasis, among others. He then describes the case of a man of 49 years, a bricklayer, who during his military service in 1917 had an attack of dysenteric symptoms which was diagnosed as duodenal ulcer and cleared up after a year's treatment with kaolin and belladonna. In 1942, he had another dysenteric attack which lasted for 45 days. In December that year he had vague pains with fever and, on a diagnosis of hepatitis, probably of amoebic origin, was given emetine. The fever disappeared, but abdominal pain persisted and a swelling developed in the right iliac fossa. Minute forms of *E. histolytica* were seen in the faeces. A negative W.R. ruled out syphilis. X-rays after a barium meal showed that the swelling was in the wall of the caecum and after considering cancer, tuberculosis and intestinal parasites it was decided to give a course of emetine, and the tumour disappeared. [The title of this paper is not well chosen; because amoebiasis of the caecum may be confused with malignant growth, this is not an adequate reason for a diagnosis of "pseudocarcinoma." See also this *Bulletin*, 1943, v. 40, 145, 1946, v. 43, 133, 651, 1140.] *H. Harold Scott.*

COLLARD, P. & KENDALL, D. Cerebral Amoebiasis treated with Emetine. Report of a Case. *Lancet*. 1947, July 5, 17-18, 1 chart.

A regular soldier served eight years in the Middle East, where he suffered from numerous diarrhoeal attacks; no diagnosis of dysentery was made at the time of these. Two weeks after his return to Britain he became acutely ill. On admission to a neurosurgical unit he had fever (101.4°F.), weakness of the right external rectus, moderate neck rigidity, and a bilateral positive Kernig's sign. Cerebrospinal fluid was clear, at a pressure of 15 mm. H₂O, and contained 10 lymphocytes per cmm. No cystic or vegetative *Entamoeba histolytica* were found in five stool specimens. A week later, the liver was found to be enlarged and tender. A course of emetine hydrochloride, one grain daily, was begun; in 48 hours improvement was apparent; within six days the general condition had much improved, the fever being slight and intermittent and the symptoms and signs in the liver area diminished; the weakness of the right external rectus had gone, but some weakness of the right lower face had developed. In another week, when the cerebrospinal fluid was re-examined, it was found to be normal. Convalescence was interrupted by an acute right-sided lobar pneumonia; on radiological screening, two months after treatment with emetine, the diaphragm was found to be raised and limited in movement. A course of E.B.I. was subsequently given, and the patient was eventually discharged apparently fully recovered in every respect but for persistence of the raised level and deformity of the right diaphragm.

[In the reviewer's opinion, this might well have been an example of early cerebral amoebiasis following hepatic amoebiasis. It is unfortunate that the diagnosis rests solely on such evidence as the history, on liver involvement, and on the "dramatic response to emetine," and that it was not founded on the surer grounds of a microscopical diagnosis of the basic infection.]

A. R. D. Adams.

KOURI, P., IRIONDO, M. & FUSTÉ, R. Amebiasis cutanea por *Endamoeba histolytica*. Reporte de un caso personal. [Cutaneous Amoebiasis caused by *E. histolytica*.] *Kuba*. Habana. 1947, Apr., v. 3, No. 4, 98-9.

ARNETT J H Treatment of Carriers of *Endamoeba histolytica* and other Protozoa with Carbarsone, Chlulofon and Vioform *Amer J Med Sci* 1947 May v 213 No 5 608-10

In previous studies the author and his colleagues reported an incidence of carriers of *E histolytica* in certain institutions in Philadelphia amounting to 4 to 11 per cent [this Bulletin 1936 v 33 529 *ibid* 1942 v 39 534] these figures were a local confirmation of the opinion of CRAIG (*Amebiasis and Amebic Dysentery* Baltimore 1934 p 46) and others that 5 to 10 per cent of people in the United States harboured this parasite.

In the present study the author examined the efficacy of certain drugs in relieving carriers of the problem of treating persons actually suffering from amoebic dysentery. In the early part of the work two courses of chlulofon or carbarsone were given to alternate patients later this was reduced to one course and finally vioform was given to 12 successive patients. The study was controlled by stool examinations before during and for some time after treatment.

The following criteria were adopted — at least two positive stools before treatment.
(1) For inclusion in this study — at least two positive stools before treatment.
(2) For disappearance or for a week after recurrence of one or more positive stools after treatment.
(3) For reappearance of one or more positive stools after disappearance

The results with the different preparations were as follows —
Chlulofon — This was given as 1 pill of 0.25 gm three times daily on the first day 2 pills on the second to the fifth days and 3 pills on the sixth and seventh days. Of 16 carriers of *E histolytica* 4 were not given full treatment because of diarrhoea. In 11 of the remaining *E histolytica* disappeared from the stools in an average of 2.9 days. The twelfth patient required a second course before the organism finally disappeared.

Carbarsone — This took the form of 1 capsule of 0.25 gm morning and evening for 10 days. Of 13 carriers 4 complained of diarrhoea, dizziness, constipation and rectal itching respectively. In 12 cases the parasite disappeared in an average of 1.9 days. In the thirteenth it only disappeared 6 weeks after a second course of carbarsone.

Vioform — This was given as 1 capsule of 0.25 gm 3 times daily for a week. In all of 12 cases *E histolytica* disappeared from the stools in an average of 1.7 days.

All three drugs were thus efficient in ridding apparently healthy carriers of *E histolytica*. Less success was encountered however in the case of other protozoa which were studied as a secondary investigation. Details are given of the effects of the 3 drugs in the case of carriers of *E coli*, *Endolimax nana*, *Dientamoeba fragilis*, *Iodamoeba* and *Chilomastix*. In the few cases studied the parasites tended to reappear when treatment was stopped and in general the drugs were not as effective as they were in eliminating *E histolytica*.

H J O D Burke Gaffney

OSTROUMOV I G [Materials on the Problem of the Identity of *Balanitidium suis* and *B coli*] *Med Parazit & Parazit Dis* Moscow 1946 v 15 No 5 43-4 [In Russian]

Previous surveys carried out in Soviet Central Asia have shown that the incidence of *Balanitidium coli* infection in man was extremely low while in pgs

it reached 62 per cent. in some localities. The author undertook an investigation with the view to throwing further light on the incidence of halantidial infection in pigs and the rôle of these animals as reservoirs of human infection. The examination of the intestinal contents of numerous pigs revealed the presence of ciliates almost exclusively in the caecum while the distal portion of the large bowel was very rarely infected. Neither the active forms nor their cysts were ever found in the stools. A comparison of the structure of the porcine and human halantidia has convinced the author that they represent two distinct species: *B. coli* in man and *B. suis* in the pig. The two strains also differed in their cultural requirements. Though the incidence of infection in pigs was high, the author failed to discover any cases of infection among the workers in the slaughter-house from which the material was obtained. From these observations, he concludes that domestic pigs play no part in the epidemiology of human balantidiosis.

C. A. Hoare.

MAY, Ella L. *Isospora hominis* in Man. Report of a Case. *Amer. J. Trop. Med.* 1947, May, v. 27, No. 3, 323-6, 5 figs.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

BALTAZARD, M., MOFIDI, C. & BAHMANYAR, M. Solution aux difficultés de l'expérimentation avec le spirochète d'Obermeier, *S. recurrentis*, agent de la fièvre récurrente à poux. [A Solution of the Difficulties of Experimenting with Obermeier's Spirochaete, *S. recurrentis*, the Agent of Louse-borne Relapsing Fever.] *C. R. Acad. Sci.* 1947, June 30, v. 224, No. 26, 1858-60.

The study of *S. recurrentis* has been made difficult by the feeble receptivity of most laboratory animals, with the exception of monkeys. The authors have investigated the receptivity of newly-born rodents and find that all those infected, but that, among those

butaneously with blood from a human case of relapsing fever, all became positive after an incubation period of 18-36 hours, and by the 4th day showed an average of more than 200 spirochaetes per field. Of these 19 rabbits, 3 were sacrificed for passage, 4 died of the infection with enormously enlarged spleens, 3 had a single attack and recovered, and of the remainder, 8 had a second attack, of which 2 died. The relapse developed from 3 to 8 days after the first attack and lasted up to 4 days. The length of the infection in these animals makes it easy to obtain

respectively 30, 20, 28, 12 and 5 lice taken off relapsing fever patients, and subsequently fed for 10 days on a normal subject. No spirochaetes could be detected on dark-ground examination of emulsions of these lice, yet the five lots all produced infection, the first four being rapidly fatal.

Human lice will readily bite newly-born rabbits, and a single meal from an animal containing spirochaetes in its blood is sufficient to infect the lice, even though subsequently fed on normal human blood. Ten experiments with one lot of 11 lice, three of 5, one of 4 and five of single lice, each of which had a single infective meal were, 7 to 8 days later inoculated into young rabbits: seven gave positive results.

E. Hindle.

BALTAZARD M MOFIDI C BAHMANIAR M & SEYDIAN B Modifications dans le comportement de souches de *Spirochaeta recurrentis* passées par les rongeurs [Modifications in the Behaviour of Strains of *Spirochaeta recurrentis* passaged through Rodents] *C R Acad Sci* 1947 July 7 v 225 No 1 82-4

An extension of the authors' previous observations on the great susceptibility of newly born rodents to *Spirochaeta recurrentis* [see above]. When the strains were passaged rapidly on the 4th to the 6th day of infection they preserved the same characters as when isolated namely an infection of 3 days or more in white mice a shorter and less intense infection in rats and a very feeble or inapparent infection in guinea-pigs and adult rabbits. When however the infection in the newly born rabbits was allowed to relapse and passages were made from them on the 1st 2nd and 4th days of the relapse a new type of infection was produced. This was invariably fatal in newly born rabbits which showed an enormous spleen discoloured liver and jaundice, in adult mice and rats it produced an intense infection of 15 days duration but in adult guinea-pigs no obvious infection.

One of the authors became accidentally infected with this strain and after 5 days incubation period had a slight febrile attack (39°C) of only 24 hours' duration without spirochaetes appearing in the blood and a second attack 11 days later also without any spirochaetes being detected by microscopic examination but during which the strain was isolated from the blood and found to be extremely pathogenic to rats and newly born rabbits. Finally a number of *Ornithodoros* were infected by feeding on a rat during the second passage of the strain and transmitted the infection by lute.

Two other strains of *S. recurrentis* have been isolated and showed the same alteration namely an increase of virulence to rodents and diminution of virulence to man. This recalls observations on the Persian strain *S. microti* [see this *Bulletin* 1947 v 44 92]. Also it seems probable that the same phenomenon occurred at the Georg Speyer Haus at Frankfurt where their Russian strain of relapsing fever became very pathogenic to mice but practically non pathogenic to man and was transmissible by *Ornithodoros*.

According to one of the authors the strain of *S. recurrentis* in man can be distinguished under dark ground illumination from *S. microti* as the latter shows a double contour instead of a uniform refraction. It is considered that *S. recurrentis* is merely a variant of the stable species occurring in rodents and transmitted by *Ornithodoros*.

E Hindle

SOFIEV M S & LEITMAN M Z [On the Possibility of Transmission of Spirochaetes of Louse-borne Relapsing Fever by Ticks and of Spirochaetes of Tick-borne Relapsing Fever by Lice] *Med Parazit & Parasitic Dis* Moscow 1946 v 15 No 3 81-4 [In Russian]

Tick borne relapsing fever is endemic in Soviet Central Asia where its distribution is focal corresponding to the areas where *Ornithodoros* occurs. On the other hand louse-borne relapsing fever has been known to occur in that country sporadically in the course of several years to disappear again for scores of years. Since the relationship of the two types of the disease has not been elucidated the authors have undertaken a series of experiments with the following objects: (1) to study the behaviour of spirochaetes of louse-borne fever in *Ornithodoros*; (2) to determine whether these spirochaetes can be transmitted by the bite of ticks; and (3) *vice versa* whether lice are capable of transmitting tick borne spirochaetes. In the course of these experiments ticks (*O. papillipes* and *O. tartakowskyi*) were fed on patients suffering from louse-borne relapsing fever. At different intervals the ticks were dissected,

and their gut contents were examined microscopically and inoculated into guineapigs and mice. They were also allowed to feed on human volunteers and mice to determine the possibility of transmission by the bite. As regards the experiments with lice, laboratory-bred *Pediculus humanus corporis* were fed for five days on patients infected with tick-borne fever for therapeutic purposes, and subsequently for five days on normal persons. On the sixth day after the last infective feed, the lice were emulsified and inoculated subcutaneously into other G.P.I. patients.

The results of the experiments were as follows: (1) Spirochaetes of louse-borne relapsing fever can survive and multiply in *Ornithodoros* for 134 days after the ticks had fed on a patient; (2) the spirochaetes of louse-borne fever cannot be transmitted to mice, guineapigs and man by the bite of such ticks; (3) none of the lice fed on patients suffering from tick-borne fever contained any spirochaetes, nor did any of the human beings inoculated with material from such lice acquire an infection with relapsing fever. C. A. Hoare.

EKZEMPLJARSKAJA, E. V. [On the Chemotherapy of Tick-borne Relapsing Fever.] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 4, 63-5. [12 refs.] [In Russian.]

The author records the result of tests on the treatment of experimental tick-borne relapsing fever, carried out with the following chemicals: (1) calinin

pigs, while 15 animals served as controls. Inoculations were made intraperitoneally with the blood of a guineapig infected by the bites of *Ornithodoros papillipes* with a Pamir strain of spirochaetes. Treatment was initiated as soon as spirochaetes appeared in the peripheral blood of the animals. The Pamir strain produced four paroxysms of fever, the first of which lasted 2-6 days, the remaining 1-2 days each; the total duration of the disease being one month. The results of the experiments were assessed by the degree of parasitaemia during the paroxysms, which in the control guineapigs amounted to 30-50 spirochaetes per field of a thick film stained by Giemsa's method. In the groups of guineapigs treated with sulgin, streptocide and fouadin-concentrate the number of spirochaetes never exceeded 18-20 per field, while in those treated with aryl-fouadin only 12-14 were present at the height of the paroxysms. As regards acrique and hismuth, the course of the infection in animals treated with these drugs did not differ in any way from that in untreated control guineapigs. C. A. Hoare.

YAWS.

DWINELLE, J. H. La campaña contra la frambesia de la Misión Sanitaria Americana de la Oficina de Asuntos Interamericanos. Valor de la penicilina en el tratamiento de la frambesia. [Penicillin in the Treatment of Yaws.] *Kuba. Habana.* 1947, Apr., v. 3, No. 4, 84-6.

This paper refers to treatment in Haiti where about 85 per cent. of the rural population are affected; here the problem is difficult because the standard of education is low and all instruction must be given verbally, and also, as elsewhere, improvement of symptoms results in absenteeism and neglect of further treatment.

Five hundred cases of yaws in the primary and secondary stages were divided into three groups for treatment by penicillin (1) 200 were taken into hospital and given sodium penicillin 40 000 Oxford units every 3 hours intramuscularly day and night for 4 days to a total of 1 200 000 units. The results were spectacular joint pains disappeared in 24-48 hours the plantar (crab) yaws became painless in 48-72 hours the other lesions dried up in 24 hours and many of them were covered with epithelium in 4 days and were quite cured within a month. Biopsy material showed when stained numerous spirochaetes in the first 12 hours few in 22 hours and none after that. About half the patients had a rise of temperature to 100°-104°F (38°-40°C) 2-8 hours after the treatment was started (probably a Herxheimer reaction). (2) A second group of 151 not taken into hospital were given calcium penicillin in peanut oil with 4.8 per cent beeswax 300 000 units per cc one injection daily on two successive days to the same total as group 1 i.e. 1 200 000 units for adults children less according to age (presumably each dose was 2 cc). (3) A group of 149 also treated as outpatients and given the same dose as those of group 2 but in two injections on the same day at a 12 hour interval. The results in the last two groups are said to have been even better than in group 1 and there was the added advantage that there was no need for hospitalization. All were kept under observation for a year and there was no clinical relapse and the patients were therefore rendered non-infective but the serological tests did not continue to give negative results. *H. Harold Scott*

LEPROSY

BARMAN, J. M. Absorción de los ésteres etílicos y bencílicos del aceite de chaalmoogra administrado por vía duodenal [Absorption of Chaalmoogra Derivatives administered directly into the Duodenum] *Rev. Argentina Dermatosisifilología* 1947 Apr. v. 31 No. 1 103-7 1 fig.

The dosage of chaalmoogra oil administered intramuscularly is limited

drug by duodenal tube to by pass the stomach. He estimated the faecal fat total neutral fats and fatty acids before giving the drug and in the two motions after the administration. Of 11 patients so treated nine showed a small increase in the fatty acids eliminated in two only was there a marked increase in excreted fat indicating in the former that the preparations used the ethylic and benzyllic esters had been absorbed.

He next carried out experiments on dogs. They were kept without food for 18-24 hours then the thoracic duct was opened under anaesthesia and 20-30 cc of the chaalmoogra preparation were passed by catheter into the duodenum. The times when the lymph began to be turbid when it became quite milky and when it cleared again were noted also the degree of leucemia in the dogs and it is stated in the human subjects [but see below]. Two of the dogs died under the operation one probably from the anaesthetic and

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been satisfactory. Examination of the liver and lungs showed fatty deposits there indicating that absorption from the duodenum takes place in part at

least, by the blood-stream. [Doubtless others will try this method. The present paper lacks important information; thus, no mention is made of the dosage used in the human patients, nor of the type or stage of the disease; again, after stating that estimation of the lipaemia would be made in the human cases during the period of absorption, this matter is not again referred to; finally, the number of cases is very small.] *H. Harold Scott.*

HELMINTHIASIS.

BUCKLEY, J. J. C. A Helminthological Survey in Northern Rhodesia. *Helminthology*. 1946, v. 21, No. 4, 111-74, 7 maps. [17 refs.]

The author's survey of Northern Rhodesia follows the same general lines as BLACKIE's survey of Southern Rhodesia [see this *Bulletin*, 1932, v. 29, 401] made 16 years previously. Both surveys occupied about 10 months, but Northern Rhodesia has an area almost twice as great as its southern counterpart, so that the amount of time necessary for travelling reduced that available for laboratory examinations. It was necessary, therefore, to choose between covering a large area in a superficial manner or a small area more thoroughly. The latter course having been decided upon, it was only found possible to survey about one-fifth of the total territory. The survey was undertaken with a view "to estimating the importance of these infections in relation to the health of the native population, hence indirectly to that of the European community; and also for the purpose of studying the conditions which influence, adversely or favourably, the propagation and spread of helminth parasites in Northern Rhodesia". Hitherto, accurate information was lacking regarding helminth infections, although it was generally considered that they were probably more prevalent than was previously believed, particularly as regards bookworm and bilharziasis, interest in the latter disease was centred on its peculiar distribution, its sub-clinical character, and problems concerning its accurate diagnosis. *Ascaris lumbricoides* was thought to be widespread, while *Trichuris trichiura*, *Enterobius vermicularis*, *Strongyloides stercoralis*, *Taenia solium*, *T. saginata*, *Hymenolepis nana* and *Acanthocheilonema perstans* were known to occur, the latter being the only filarial parasite definitely recorded.

The area surveyed comprised the north-western half of the plateau, and an account is given of the climate, population and the agricultural practices and foodstuffs of the inhabitants, in so far as these are likely to affect the parasitic helminth fauna. Wild game is plentiful and the African is not averse to eating any part of the carcass, a point to be borne in mind when one is making routine laboratory diagnoses, thus, the presence of ova of *Rhabditis*, *Spiruridae*, Amphistomes, *Fasciola hepatica* and certain operculated Trematode eggs found in human excretions, are considered to have probably been pseudo-infections.

Six districts in all were examined and in each district a suitable Location camp and field laboratory were set up; villages within about a 10-mile radius were investigated, a total of 25 Locations being surveyed in all. In each area, specimens of faeces and of urine were collected from as representative a

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did not prove very co-operative so that the number of persons examined for evidence of filariasis (459 blood examinations and 122 skin examinations) was less than the number for intestinal (2 575) or urinary infections (2 617). No mention is made of the arthropod vectors of filariasis occurring in the various locations but the species and distribution of aquatic molluscs likely to be associated with the spread of schistosomiasis were investigated in all the areas surveyed.

The reviewer has selected the following points from the author's description of individual helminth infections but many of these observations can only be evaluated properly when considered in conjunction with the maps accompanying the paper.

Hookworm infections. *Necator americanus* was the only species encountered amongst a total of 235 hookworms collected from 20 positive cases. In 88 per cent of a small series of treated persons the number of worms recovered was less than 10 and in only one case did it exceed 50. Locations having a high incidence of 50 per cent and over were associated with relatively low altitude or with different agricultural practices. As regards altitude the author considers that the factor here involved must be temperature since according to available records there is no correlation between rainfall and altitude. As regards agriculture evidence is brought forward to show that the nature of the crop and its distance from the village may have an important influence on hookworm dissemination thus cassava gardens which are usually near villages are associated with heavy infestation whereas millet gardens are usually distant from the villages and are associated with a low incidence probably because of a more scattered distribution of faecal deposits. The author considers it probable that hookworm is the agent responsible for famine lassitude since in times of famine the local African's capacity for work diminishes out of all proportion and even the stimulus to produce more food is insufficient to counteract this lassitude (similar cases of famine lassitude however have been reported from other countries where hookworm is not known to exist).

Strongyloides spp. infections. Both *S. fulleborni* and *S. stercoralis* occurred in the area surveyed and tended to parallel hookworm infections as regards incidence and geographical distribution in regions where they were co-endemic.

Ascaris lumbricoides infections. Unlike the preceding parasites this helminth was not found to be widespread in the area surveyed and had a dissimilar geographical distribution. The author enters into a careful discussion of the reasons for this distribution and believes that although many causes are at work congestion of population is the ruling factor.

Filarial infections. Four hundred and fifty nine night films revealed embryos of *A. persians* in 5.4 per cent of the cases and 151 day films showed them in 6.6 per cent. It is evident that this is an endemic infection in some parts of Northern Rhodesia. Microfilariae of *W. bancrofti* were demonstrated in the blood of only 3 persons in none of whom the infection was acquired in the blood elsewhere than in Rhodesia is also lacking and the condition known as thick leg is believed to be non filarial in origin [see this Bulletin 1942 v. 39 199 1946 v. 43 1186]. Microfilariae of *Loa loa* were not found in the blood specimens examined although the presence of this filaria has been reported by DE MEILLON (personal communication) in the blood of six Africans from Northern Rhodesia. No onchocerciasis was found in skin snips from 122 Africans.

Bilharzia infections. *Schistosoma haematobium* and *S. mansoni* are probably the most important helminth parasites occurring among the human population in N. Rhodesia and particular attention was paid to the incidence and distribution of these parasites and of their molluscan hosts. The results being summarized in the maps illustrating the paper. In the case of *S. haematobium*

the percentage rate of infection varied in different Locations from zero to over 60 per cent. No difference was observed in the infection rate among males and females, but children were more often infected than adults—45.9 per cent. as compared with 20.6 per cent. In 256 positive children haematuria was observed in 41.4 per cent., while in 123 positive adults it was seen in only 26 per cent. Natural infections with cercariae of the human type were found in *Physopsis globosa* collected in one Location, and guinea-pigs exposed to infection from the snails subsequently showed the presence of adult schistosomes, only males being found at the autopsy. Attempts to infect this species of snail, as well as *Bulinus natalensis* and *B. forskali*, yielded inconclusive results. *P. globosa* or *P. africana* were present in every Location where *S. haematobium* was endemic; whereas in districts where a low incidence of this helminth was observed, these two species were notably absent. It may be concluded with some confidence, therefore, that these species are the vectors in the area surveyed. Both species of snails were essentially inhabitants of small streams, and tended to be scarce or absent in large rivers, lakes or swamps.

In the case of *S. mansoni*, the incidence also varied in different Locations from zero to 61 per cent. but, with one exception, Locations with high *S. haematobium* incidence never coincided with those having a high *S. mansoni* incidence. Unlike *S. haematobium*, the difference between the infection rates in adults and children was not significant. The sex incidence also differed, for a higher proportion of both adults and children, 23.2 and 32.7 per cent. respectively, were found infected in the female group, as compared with the male group, 13.5 and 20.4 per cent. The author notes that microscopic examination of faecal specimens at Niamkolo, where the infection rate was highest and *S. mansoni* eggs seemed to be most numerous in the stools, revealed no signs of blood or mucus. This finding supports the view put forward later in the paper that, "There is a trend of opinion in recent literature on schistosomiasis to the effect that in endemic areas where gross manifestations of the disease are not apparent, it may nevertheless exist in a sub-clinical form of great insidiousness." Natural infections with cercariae of the human type were found in 22 per cent. of *Biomphalaria pfeifferi* examined and this species is probably the vector of *S. mansoni* in the area surveyed; evidence regarding the closely allied *B. tetragonostoma* was inconclusive. Both species of snails, as in the case of *S. haematobium* vectors, occurred most commonly in small streams. The explanation of the scarcity of molluscan hosts of both species of schistosomes from large areas of water, such as lakes and swamps, is discussed and it is suggested that natural enemies, particularly birds, may be acting as biological controls.

Returning to the subject of sub-clinical infection in schistosomiasis the

it is desired to emphasize that there are some grounds for believing that a negative diagnosis by the microscopical method, at least of *S. haematobium*, does not necessarily imply freedom from the infection, and that this method should not be relied upon entirely but should be supplemented by serological tests, especially in the case of adult individuals, should there be any suspicion or history of bilharzia infection."

[This is an important paper which should prove of great practical value to all who are interested in helminthiasis and especially those concerned with the control of helminth infections in N. Rhodesia. The reviewer has dealt with some of the information it contains, but the concise nature of the report does not lend itself to further summary and it should be consulted in the original.]

R. M. Gordon.

CANÇADO J R Contribuição ao estudo da esquistosomiase mansônica no Brasil Dados relativos à sua distribuição no estado de Minas Gerais [A Study of *Schistosoma mansoni* Infection in Brazil Notes on its Distribution in the State of Minas Gerais] *Rev Brasileira Med* Rio de Janeiro 1947 Jan v 4 No 1 31-5 1 fig [36 refs]

From data as yet incomplete which the author is collecting he can state with certainty that schistosomiasis is present in a number of towns in Minas listed in the text

The disease is rare or non-existent in the south of Minas and is unknown throughout the whole of the Minas Triangle (*Triângulo Mineiro*)

In 81 persons examined for helminths by SETTE COTTA in Usina Ana

CULBERTSON J T ROSE H M & OLIVER GONZALEZ J Skin Tests in Schistosomiasis Mansoni with Antigen from Heterologous Worms (*Pneumones Planaria*) *J Infect Dis* 1947 Mar-Apr v 80 No 2 218-21

Earlier workers quoted by the authors have used for the diagnosis of human schistosomiasis antigen derived from *Schistosoma spindale* and the distomes *Fasciola hepatica* and *Eurytrema coelomaticum* Other species of trematodes

skin tests done with extracts of *P. medioplexus* were reported earlier by CULBERTSON and ROSE [this *Bulletin* 1943 v 40 471]

The washed and dried trematode material was powdered extracted for 24 hours in water and centrifuged The extract was mixed with an equal volume of 1 per cent phenol in 1.7 per cent salt solution to yield the solution used for the skin tests The dilutions of the antigen used were *S. mansoni* cercariae 1:10,000 *P. medioplexus* adult 1:1,000 *P. maculata* 1:200 The persons tested were all native male Porto Ricans aged 20 to 35 years all of whom had eggs of *S. mansoni* in their stools None of the 12 controls had ever lived in an endemic centre of schistosomiasis The skin tests were done by injecting subcutaneously into the volar surface of the forearm 0.1 cc of the antigen dilutions quoted above As a control 0.1 cc of phenolized saline was injected Ten persons with schistosomiasis were tested each with the three extracts Eight of these showed an immediate reaction to the *Schistosoma* extract 7 to the *Pneumones* extract and 9 to the extract of *Planaria maculata* One person did not react to any of the antigens None reacted to the control injections The weals obtained are illustrated None of the 12 control persons reacted to the extracts of *Pneumones* and *Planaria* The extract of *S. mansoni* had been previously tested by one of the authors on 40 persons without schistosomiasis and none of them was positive to it

The authors conclude that a common antigen occurs in the three species of trematodes, but in different quantities. *Pneumoneces medioplexus* contains at least 10 to 20 times as much of it as *Planaria maculata* does, because the *Planaria* extract failed to produce positive reactions at dilutions higher than 1 : 1,000, while the *Pneumoneces* extract still produced them at a dilution of 1 : 20,000. The cercariae of *S. mansoni* contain "vastly larger amounts" of the common antigen. One of the authors found that it can elicit a reaction even when it is diluted "up to 200,000 times" [OLIVER-GONZÁLEZ and PRATT, this *Bulletin*, 1946, v. 43, 3-18]. The authors think that the antigens used for this work would probably produce positive skin reactions in patients with most, if not all, trematode infections. They obtained, in fact, an immediate reaction with the *Pneumoneces* antigen in a patient infected with *Clonorchis sinensis*. They suggest that planarians, which are easily cultivated without any need for rearing molluscan hosts, offer unusual opportunities for the preparation of antigens for skin tests for the study of schistosomiasis.

G. Lapage.

ERFAN, M. Hepatic Bilharziasis. *J. Trop. Med. & Hyg.* 1947, June, v. 50, No. 6, 104-9, 2 figs.

In hepatic schistosomiasis, obstruction and penetration of the portal radicles by schistosome eggs, deposited by embolism through the mesenteric veins, result in inflammatory reaction with subsequent fibrosis, secondary splenomegaly and ascites, although toxins and hypoproteinaemia may play some part in producing these secondary phenomena.

In the earlier stage, the liver is smooth, enlarged and congested, with cellular granulation tissue rich in histiocytes and eosinophils around the eggs deposited in and around the portal venules; sometimes coupled worms are

of scar tissue, containing degenerated eggs, compress the portal branches, and the liver cells are commonly atrophied. The Kupffer cells show schistosomal pigment. Eggs are found in 100 per cent. of livers in stage one and in 75 per cent. of livers in stage two. *S. mansoni* infections are four and a half times as common as *S. haematobium* infections in Egyptian hepatic schistosomiasis. The spleen becomes uniformly enlarged, with patchy perisplenitis and adhesions. The splenic vein is thickened and tortuous, with thromboses in 2.5 per cent. of cases. In the earlier stages, the organ is congested with medullary hyperplasia, but later the proliferated reticulum is replaced by fibrous tissue and the Malpighian bodies become atrophied and fibrosed.

Clinically, schistosomiasis shows an early stage of cutaneous lesions at the site of cercarial invasion; secondly, fever, urticaria and eosinophilia; and thirdly urinary or intestinal symptoms with later visceral complications such as hepatic cirrhosis. In the earlier stages of hepatic involvement, there are abdominal discomfort, enlargement of the liver and sometimes of the spleen, eosinophilia, and eggs to be found in the stool. In the stage of fibrosis, the liver shrinks and

negative in the later stages, but liver puncture may reveal eggs and place the diagnosis beyond question. The course of the disease is chronic and may extend over years. The condition is to be differentiated from malaria, leukaemia, syphilis, neoplasm, or other causes of hepato-splenomegaly.

Treatment with antimony in the early stages will prevent cirrhosis, but the drug should be used with caution in the later stages. A good diet and the

LANÇADO J R Contribuição ao estudo de
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table for

DAKIN, W. P. H. & CONNELLAN, J. D. Asiatic Schistosomiasis : an Outbreak in the Royal Australian Air Force. *Med. J. Australia*. 1947, Mar. 1, v. 1, No. 9, 257-65. [31 refs.]

A unit of 565 men spent 16 days on Leyte, in the Philippines, where they bathed freely in the Bislig River, later found to be heavily infested with *Schistosoma japonicum*. Two weeks later, fever, urticaria, joint pains, and cough developed in some of the men, and within another month it was realized that many men had developed Asiatic schistosomiasis. When yet further cases of latent infection were discovered, and after unsuccessful treatment of some men with Fouadin, the unit was returned to Australia for more thorough investigation and treatment.

A diagnosis of schistosomiasis was made in 174 men either by discovery of ova in their stools (using a technique for sedimentation in 0.5 per cent. glycerin in water, modelled on that recommended by the U.S. Commission on schistosomiasis) or on a positive complement deviation test; 53 others were treated empirically with Fouadin, solely because they had eosinophilia. Of the 174 declared cases 72 (41 per cent.) were symptomless; the others suffered an initial influenzal type of illness of one to three weeks' duration, between 24 and 65 days after first infestation. All were then apparently restored to normal health, but later some of them suffered from a variety of manifestations not constituting a clear-cut syndrome. Ova were hard to find except in very heavily infected cases, and repeated examinations were necessary. Sigmoidoscopic examination showed no pathognomonic features and did not materially aid in diagnosis. Marked eosinophilia was usual during the early months of infestation, but it diminished spontaneously later; its decline was not indicative of cure.

The complement-deviation test was performed with a cercarial (*S. spindale*) antigen, prepared from the livers of *Planorbis exustus* in 1928 and refrigerated since. The test was done on 560 of the men, 10 to 12 months after exposure to infection, and fixation of three or more M.H.D. of complement constituted a positive reading; 169 men gave positive complement-deviation tests, and 139 of these were known to be, or to have been, infected by the recovery of eggs from the stools. Only five men from whom ova had been recovered failed to give a positive complement-deviation test, and no satisfactory explanation could be advanced for their failure to do so, as all were passing ova at the time of the test. In 30 cases, a positive complement-deviation test was unsupported by the identification of eggs in the stools; 22 of these 30 had marked eosinophilia (over 20 per cent.) and presented symptoms suggestive of infection; they had already been treated with Fouadin; the remaining eight of the 30 were symptom-free and had no marked eosinophilia. It is suggested that the positive complement-deviation in these cases was due (1) to infection with cercariae which failed to develop further, or (2) to the development of worms of one sex only, or (3) to early spontaneous death of mature worms.

Among 80 control sera no "false-positive" reactions were found, and it is concluded that the complement-deviation test was both sensitive and specific, a positive result indicating a need for treatment. How long the reaction remains positive after treatment was not established, but it did so for months after apparently successful treatment in certain cases, although the titre declined.

Treatment with Fouadin is easy to give, and non-toxic; but of 177 men (not all microscopically confirmed cases) so treated 103 (58 per cent.) subsequently passed ova in the stools. The results, therefore, were poor.

Potassium antimony tartrate was then given, a dosage of two grammes being administered intravenously in 22 injections over a period of three to three and a half weeks. The results of this treatment are not yet available, but will be published later. [For details of the complement fixation tests, see WILLIAMS, this *Bulletin* 1947, v. 44, 599.]

A. R. D. Adams.

LEAVITT S S & BECK O H. Schistosomiasis Japonica A Report of Its Discovery in Apparently Healthy Individuals *Amer J Trop Med* 1947 May 1 27 No 3 347-56

The staff of a military hospital in Mindoro had previously been stationed in an area of Leyte which was later discovered to be heavily infected with *Schistosoma japonicum*. The diagnosis of infection in patients who were parasitized there rested on the recovery of ova from their stools and the recognition proctoscopically of characteristic lesions in the recto-sigmoid and sigmoid mucosae. These lesions were minute sharply circumscribed areas of distended venules forming a stellate pattern and surrounded by healthy mucosa. Some of the lesions were ulcerated others had a greyish or yellow central pustule up to the size of a pin's head. Scrapings where these were made contained ova. It occurred to the hospital staff that they themselves might also be infested when a ward attendant was found to have Asiatic schistosomiasis. Thereafter a detailed survey showed 34 of the 177 hospital workers who had been at risk to be infected as judged by stool examinations and proctoscopy. Few if any of these had symptoms and signs unequivocally attributable to their infections and all 34 were treated with a course of Fouadin without any interruption of their normal duties. On re-examination proctoscopically two to four weeks later all but two men were clear of active lesions. One of these two continued to improve but the other failed to do so and was evacuated. These cases show that asymptomatic schistosomiasis may escape notice unless specifically sought for and that it readily yields to Fouadin treatment in the early stages.

[It appears a little premature in the reviewer's opinion to accept cure of these cases on the evidence so far available.] A R D Adams

WATSON C W MURPHEY F & LITTLE S C. Schistosomiasis of the Brain due to *Schistosoma japonicum*. Report of a Case *Arch Neurology & Psychiatry* 1947 Feb 1 57 No 2 199-211 [Refs in footnotes]

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As evidence of localized cerebral damage persisted, and the seizure continued, another craniotomy was done in November; the lesion previously seen was then found to have gone, but to have been replaced by scar tissue with small white hard lesions in it. A considerable subcortical scar was detected 5 cm. behind the cortical lesion. This latter could not be removed without danger to the speech area, but the superficial scar tissue was excised. Section showed large numbers of *S. japonicum* ova. The patient's general condition four weeks later—the time of writing—had much improved, and the convulsive seizures had become less frequent and less severe.

A. R. D. Adams.

- i. McMULLEN, D. B. The Control of Schistosomiasis Japonica. I. Observations on the Habits, Ecology and Life Cycle of *Oncomelania quadrasi*, the Molluscan Intermediate Host of *Schistosoma japonicum* in the Philippine Islands. *Amer. J. Hyg.* 1947, May, v. 45, No. 3, 259-73, 5 figs. [15 refs.]
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The observations and experiments recorded in these three papers were made in the Philippine Islands and are from the Commission on Schistosomiasis, Commission on Tropical Diseases, Army Epidemiological Board, Preventive Medicine Service, Office of the Surgeon General, Washington.

i. In order to attack the problem of exterminating the molluscan intermediate host, in this case *O. quadrasi*, intelligently it is important to know something of its life-cycle and habits. For this purpose, the author carried out his work in the Leyte Valley, an extensive coastal plain on the east side of the Island of Leyte, during the months of May to October, at a time usually referred to as the "dry season", although during most of the period there is an average rainfall of about 6 inches per month. Snails were present during all of this period. *O. quadrasi* is an amphibious species and is found living under variable conditions in scattered colonies, often separated from each other by extensive areas not inhabited by this species. Their main foci, so far as contact with the human population is concerned, seem to be in places kept wet in the process of rice cultivation, but it would appear that as long as the area is under cultivation, there are few, if any, snails present, and it is only when the plot is abandoned for a time that the colony once more becomes populous. For a more detailed study of the habits of the snail, four collecting stations were started in the endemic area of schistosomiasis in the Leyte Valley. Collections were made at each station every two weeks, except during parts of July and August, and a total of 16,447 snails were collected and measured to the nearest 0.25 mm. The author's observations and conclusions are summarized as follows:—

- " 1. Eggs of the snail, *Oncomelania quadrasi*, are described.
- " 2. The egg probably hatches about 2 weeks after being laid. The newly-hatched snails measure about 0.50 millimeter in length.
- " 3. Under ideal conditions the snail grows at the rate of about 0.25 millimeter per week. The shortest time required to reach maturity is 4 to 5 months. In areas where conditions are sometimes adverse, the time required would be at least a month longer.
- " 4. Some young snails appeared during the entire period of observation at all of the collecting stations. At three of the stations large broods of young were found.

LEAVITT S S & BECK O H. Schistosomiasis Japonica. A Report of its Discovery in Apparently Healthy Individuals. *Amer J Trop Med* 1947, May 1 27 No 3 347-56

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WATSON C W MURPHY F & LITTLE S C. Schistosomiasis of the Brain due to *Schistosoma japonicum*. Report of a Case. *Arch Neurology & Psychiatry* 1947 Feb 1 57 No 2 199-210 3 figs [Refs in footnotes]

After reviewing the literature on the subject the authors record details of a case of cerebral schistosomiasis. The patient a soldier probably became infected in Leyte the Philippines with *Schistosoma japonicum* on December 12th 1944. A couple of weeks later he developed indefinite symptoms and fever with diarrhoea and vomiting. In April 1945 109 days after exposure to infection he was hospitalized on account of continuing fever diarrhoea and abdominal cramps. Stool examination showed the presence of ova of *S. japonicum* and ten 1 grain injections of emetine hydrochloride were given. By the end of June 1945 he had become emaciated suffered abdominal cramps and had distended superficial veins over the lower abdomen and he had suffered ten convulsive seizures by this time. The numerous investigations detailed included electroencephalography and ventriculography repeated stool examinations failed to reveal the presence of schistosomal ova at this time.

As there was conclusive evidence of an increasing lesion in the left parieto-temporal region with intracranial calcification in the left temporal horn craniotomy was performed. The dura was tense and could be opened only after spinal puncture to reduce intracranial tension. An area of discolouration and induration studded with multiple tiny white nodules was seen in the posterior third of the superior temporal gyrus at one point it invaded the dura and it seemed to extend subcortically. The mass was five to six cm in diameter. It was incised but could not be removed as it involved the speech centre. A subtemporal decompression was done. In a biopsy specimen were seen bodies suggestive of ova in focal necrotic areas in a zone of eosinophils and surrounding

gliomatous proliferation. Stained sections showed many ova of *S. japonicum*. In July, after the operation, a course of Fouadin was given.

As evidence of localized cerebral damage persisted, and the seizure continued, another craniotomy was done in November; the lesion previously seen was then found to have gone, but to have been replaced by scar tissue with small white hard lesions in it. A considerable subcortical scar was detected 5 cm. behind the cortical lesion. This latter could not be removed without danger to the speech area, but the superficial scar tissue was excised. Section showed large numbers of *S. japonicum* ova. The patient's general condition four weeks later—the time of writing—had much improved, and the convulsive seizures had become less frequent and less severe.

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[It appears a little premature in the reviewer's opinion to accept cure of these cases on the evidence so far available.] A R D Adams

WATSON C W MURPHY F & LITTLE S C Schistosomiasis of the Brain
due to *Schistosoma japonicum* Report of a Case Arch Neurology &
Psychiatry 1947 Feb 57 No 2 199-210 3 figs (Refs in footnotes)

After reviewing the literature on the subject the authors record details of a case of cerebral schistosomiasis. The patient a soldier probably became infected in Leyte the Philippines with *Schistosoma japonicum* on December 12th 1944. A couple of weeks later he developed indefinite symptoms and fever with diarrhoea and vomiting. In April 1945 109 days after exposure to infection he was hospitalized on account of continuing fever diarrhoea and abdominal cramps. Stool examination showed the presence of ova of *S. japonicum* and ten 1 gram injections of emetine hydrochloride were given. By the end of June 1945 he had become emaciated suffered abdominal cramps and had distended superficial veins over the lower abdomen and he had suffered ten convulsive seizures by this time. The numerous investigations included electroencephalography and ventriculography repeated stool examinations failed to reveal the presence of schistosomal ova at this time. As there was conclusive evidence of an increasing lesion in the left parietal region with intracranial calcification in the left temporal horn craniotomy was performed. The dura was tense and could be opened only after spinal puncture to reduce intracranial tension. An area of discoloration and induration studded with multiple tiny white nodules was seen in the posterior third of the superior temporal gyrus at one point it invaded the dura and it seemed to extend subcortically. The mass was five to six cm in diameter. It was incised but could not be removed as it involved the speech centre. A subtemporal decompression was done. In a autopsy specimen were seen bodies suggestive of ova in focal necrotic areas in a zone of eosinophils and surrounding

"7. Dinitro-ortho-cyclohexylphenol and its dicyclohexylamine salt were effective at the rate of 2 pounds per 1,000 square feet. The dinitro-secondary butylphenol is considered too dangerous for ordinary use.

"8. All of the chemicals except the two best dinitro compounds injured the vegetation when applied in sufficient quantity to kill the snails.

"9. The cost varies from \$0.54 to \$5.40 per 1,000 square feet, with the different chemicals, when areas are treated that are heavily overgrown with grass. With the chemicals applied as dusts the amounts probably could be greatly reduced by removing a large portion of the vegetation.

"10. Best results would be obtained if chemical control was combined with drainage and removal of the taller vegetation. Good farming practices and drainage similar to that used in mosquito control would be essential."

[Part III of this series has not yet appeared in print.]
iii. Although no satisfactory method is known for killing cercariae in natural bodies of water, the cercaricidal effects of some substances have been demonstrated [HASSAN, this *Bulletin*, 1932, v. 29, 43; PENSO, *ibid.*, 1937, v. 34, 398; KRAKOWITZ, *ibid.*, 1941, v. 38, 376]. Chemicals effective against both the intermediate host and the cercariae would have obvious advantages, and the authors in their experiments used 10 chemicals which had already been tested in the control of *O. quadrasi*; but they point out that chemicals with only cercaricidal powers might be used as temporary control measures. The tests were carried out by exposing the cercariae to solutions of the various chemicals in the laboratory, and also by placing vessels containing live cercariae in a plot of ground and subsequently dusting a known area of the plot with a known amount of the chemical. It was observed that if infected *O. quadrasi* were kept in water in containers, the discharged cercariae at once came to the surface film and remained attached to it; if, as appears probable, they also attach themselves to the surface film in natural bodies of water, this habit might render them particularly vulnerable to surfacedust. The following is the authors' summary:—

"1. Ten chemicals that had been used in experiments on the control of *Oncomelania quadrasi* have been tested for their cercaricidal powers.

"2. Calcium arsenate, copper carbonate, copper cyanamide, copper guany-lurea, and Paris green in concentrations up to 100 p.p.m., had no observed effect on the cercariae of *S. japonicum*.

"3. Copper sulphate had no observed effect on the cercariae at 10 p.p.m., but a concentration of 100 p.p.m. killed all of them in 10 minutes.

"4. Dinitro-2-butylphenol was not effective at 10 p.p.m., but all cercariae were killed in 3 minutes when exposed to 100 p.p.m.

"5. Dinitro-ortho-cyclohexylphenol, 10 p.p.m., killed 60 per cent. or more of the cercariae in 15 minutes. With 100 p.p.m. nearly all cercariae were dead after 1 minute; all were dead after 15 minutes.

"6. In two experiments with the dicyclohexylamine salt of dinitro-ortho-cyclohexylphenol, 10 p.p.m. killed all the cercariae in 3 minutes. In a third experiment, however, two cercariae survived 15 minutes of exposure. At 100 p.p.m., 99 to 100 per cent. of the cercariae were killed within 1 minute, and all were dead in 15 minutes. When used as a dust, at the rate of 1 pound per 1,000 square feet, all cercariae were killed in the test vials after 15 minutes of exposure.

"7. CC2, a Chemical Warfare Service product whose composition is 'secret', was not tried in solutions of known concentrations. When applied as a dust at the rate of 6 pounds per 1,000 square feet, it killed all cercariae in 5 minutes."

R. M. Gordon.

SMYTH, J. D. The Physiology of Tapeworms. *Biol. Reviews*. 1947, July, v. 22, No. 3, 214-38, 1 fig [Numerous refs.]

5 At one of the stations it has been shown that the adult snails lived for at least 3 months. At the end of the period of observations there was no evidence that this group was dying out and it had not had a major reproductive period. It would appear therefore that the snail probably has a life span covering at least 1 year.

6 The smallest snails with mature cercariae obtained in the field measured 3.00 millimeters in length. These snails were at least 10 weeks old and must have been infected shortly after hatching since the development of *S. japonicum* in *O. quadras* requires 11 weeks under laboratory conditions.

7 Data from the crushed snails indicate that penetration by the miracidium is not confined to the very young.

8 At one station where the incidence was relatively high there was some evidence that the rate of infection decreased during the dry season.

9 Owing to its establishment in a large and varied animal reservoir the control of schistosomiasis caused by *S. japonicum* presents difficulties not encountered in the control of *S. mansoni* and *S. haematobium* since for all practical purposes the adult stages of the latter worms are confined to the human host. The authors consider that under wartime conditions impregnated clothing and protective ointments offer very considerable protection. [WRIGHT 1945 unpublished report and FERGLSON *et al* this Bulletin 1945: 44-45]. The proper chlorination of water renders it safe for drinking and bathing but so far no cercaricide has been found which is effective in large bodies of natural water and the elimination of the molluscan host *O. quadras* remains the most practical means of control. Snails of this species are amphibious and operculated and are therefore not as easily exposed to chemicals as are the aquatic non-operculated snail.

As a result of the observations recorded in the previous paper it was thought that a chemical used for the control of this snail should have the following properties: (1) it should be usable as a dust or a spray depending on existing conditions; (2) it should stick to the vegetation but it is also important for some of it to get down to the surface of the soil; (3) it should not injure vegetation; (4) it should be relatively non-toxic to vertebrates; (5) its action should be such that the snail will not evade the chemical; (6) it should also kill the eggs. The authors tested 19 different materials. At the beginning a few laboratory tests were made but these were later abandoned in favour of the much more reliable field tests which were carried out on plots of ground or in prepared ponds to 100 or more snails per square foot on plots of ground or in prepared ponds. The authors summarize the results they obtained as follows:—

1 The best time to use chemicals in controlling *O. quadras* is during a relatively dry season in which the snails are still active.

2 Nineteen chemicals have been tested for toxicity in experiments with this snail.

3 In testing their toxicity 3 different types of plots were devised. A small grass plot enclosed in a dehydrated food tin served for screening tests. The minimum lethal doses were determined on 25 square feet of natural habitat or in artificial pond plots containing 25 square feet.

4 *Bug gels* which contains calcium arsenate, formaldehyde, para-dichlorobenzene, dichloro-diphenol trichlorethane (DDT), Bordeaux mixture, copper cyanamide, slaked lime, CC2 and 2-phenol-cyclohexanol did not give satisfactory results.

5 Copper sulphate, copper carbonate, copper guanidurea, calcium arsenate and calcium cyanamide killed the snails when applied at the rate of 12 pounds per 1,000 square feet.

6 Paris green killed the snails when applied at the rate of 5 to 6 pounds per 1,000 square feet.

"7. Dinitro-ortho-cyclohexylphenol and its dicyclohexylamine salt were effective at the rate of 2 pounds per 1,000 square feet. The dinitro-secondary butylphenol is considered too dangerous for ordinary use.

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R. M. Gordon.

CHAUDHURI, R. N. & MUKERJI, A. K. Death following Administration of Tetrachlorethylene. *Indian Med Gaz* 1947, Mar, v. 82, No 3, 115-16.

Tetrachlorethylene is popular in the treatment of hookworm disease because of its low cost, low toxicity and high efficacy and although toxicity has been reported, usually in the form of a temporary narcotic effect, and in at least two cases, in the form of coma [*this Bulletin*, 1942, v. 39, 7], a fatal result does not appear to have been recorded.

The patient in the present case was a street beggar, aged 30 years, who was very emaciated (he on and feet. He complained for one year, together

Full laboratory examinations were made and apart from some anaemia the principal finding was the presence of 100 hookworm ova per cc. of stool. The diarrhoea was stopped after a week's treatment with sulphaguanidine (2 gm. every four hours) and multivitamin tablets (2 twice daily). The patient was then put on haemosan (2 tablets three times daily) and magnesium trisilicate (dose not stated but thrice daily after meals). On the sixth day of the latter treatment, he was given 3 cc. of tetrachlorethylene shaken in an ounce of sodium sulphate mixture (containing 4 drachms of sodium sulphate) at 7.30 a.m. A little more than 2 hours later, he was drowsy (a not unusual effect of the drug) and he had abdominal pain and vomited once, the pain

blackish. The liver was small, pale and soft, with an indistinct pattern

ylene and note that with its low rate of absorption in the absence of alcohol or fatty substances. They quote a number of cases in the literature in which symptoms of intoxication followed even therapeutic doses but all of these recovered.

The extreme malnutrition of the patient is stressed and it is suggested, in the absence of signs of specific aetiology, that the chronic diarrhoea was a "nutritional diarrhoea", and that the small intestine, thus involved, was especially vulnerable to the effects of tetrachlorethylene.

While hesitating to draw conclusions from a single case, the authors suggest the wisdom of withholding anthelmintics from those suffering from hookworm who have obvious signs of malnutrition as is done when patients suffering from hookworm disease with severe anaemia are first treated for the latter condition.

[While the author's advice is timely, it would be difficult to point to the exact ultimate cause, or causes, of death in this case: the patient was already in a very bad condition, and several forms of medication were necessary: although it seems evident that the tetrachlorethylene was an accentuating cause, it would not be proper, as the authors rightly point out, to discredit it on this count, in view of its generally recognized low toxicity.]

H. J. O'D. Burke-Gaffney

HITCH, J. M. Systemic Treatment of Creeping Eruption. *Arch. Dermat. & Syph.* 1947, May, v. 55, No. 5, 664-73. [13 refs.]

For larva migrans no satisfactory treatment, either local or systemic, has yet been devised. Approximately 40 cases of this condition were seen at a naval hospital in North Carolina between July and December 1945. Of these, 33 were given treatment and were followed for a sufficient time to make their cases worth recording.

The diagnosis was made on clinical grounds, supported by the circumstantial evidence of a local canine and feline population with heavy *Ancylostoma braziliense* infection, a sandy soil, and a high rainfall.

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e no difference to the
[presumably lesions]
ranged from one to considerably more than a hundred on a single patient."
ral finding, but there was little correlation between
and the extent of the lesions. The sedimentation
there was no evidence of anaemia.

In no case was an intestinal infection of *A. braziliense* demonstrated, and X-rays showed no lung lesions in any case.

The drugs used were foudadin, neostibosan, potassium antimony tartrate and oxophenarsine hydrochloride. In many cases, more than one drug was given at different times.

With foudadin, 17 patients were treated with doses from 5.0 ml. in adults to 1.0 ml. in young children. Five were classed as cured after 15, 8, 4, 4 and 2 injections. Amongst the failures, four had 10 or more injections.

With neostibosan, 10 were treated with doses of 0.15 to 0.2 gm. for adults and 0.05 gm. for young children. Of these, 3 were classed as cured after 2, 2 and 1 injections. None of the failures had more than 1.75 gm. of the drug.

Only 2 patients were treated with potassium antimony tartrate: one received the negligible amount of 0.01 gm., after which a change was made to foudadin, and the other received 0.75 gm. The latter was classed as cured, but this patient had previously had both foudadin and neostibosan.

Oxophenarsine hydrochloride was given to 17 patients, intravenously every 3 to 5 days, in doses of 0.06 gm. for adults and proportionately for children. Of these 17 patients, 8 were cured and the fate of four was unknown. The cured patients received an average of 4 injections each, from 1 to 9, and the 5 failures from 2 to 9, average 5 injections.

It is concluded that the "evidence at hand indicates that oxophenarsine hydrochloride is probably superior to the others employed for this disease."

It was pointed out that clinical considerations had precedence in this investigation so that appraisal of the value of these drugs is difficult. There is nowhere any positive correlation between the amount of drug given and the therapeutic effect. The immediate clinical response was usually a cessation of pruritus, which suggests that all these drugs have a "larvostatic" action: this was somewhat commoner with oxophenarsine hydrochloride. It was thought possible that larger doses might have produced more definite results.

[On the data presented, there is no real evidence that any drug had any permanent effect. The dosage of the antimony drugs was, except in one or two cases, very far below the level at which one could expect any anthelmintic effect, if one is to judge by recent work on filariasis and schistosomiasis.]

Lt E. Napier.

CHAUDHURI R N & MUKERJI A K Death following Administration of Tetrachlorethylene *Indian Med Gaz* 1947 Mar v 82 No 3 115-16

Tetrachlorethylene is popular in the treatment of hookworm disease because of its low cost low toxicity and high efficacy and although toxicity has been reported usually in the form of a temporary narcotic effect and in at least two cases in the form of coma [this *Bulletin* 1942 v 39 7] a fatal result does not appear to have been recorded.

The patient was a 20 year old male who was very emaciated and had very little strength. He had been suffering from diarrhoea for one month and his feet were very swollen.

Full laboratory examinations were made and apart from some anaemia the principal finding was the presence of 1 100 hookworm ova per cc of stool. The diarrhoea was stopped after a week's treatment with sulphaguanidine.

The patient was given 1 mgm of atropine on the sixth day of the latter treatment he was given 3 cc of tetrachlorethylene shaken in an ounce of sodium sulphate mixture (containing 4 drachms of sodium sulphate) at 7.30 a.m. A little more than 2 hours later he was drowsy (a not unusual effect of the drug) and he had abdominal pain and vomited once. The pain increased and in the afternoon he was given 1/100 grain of atropine 2 cc of somnifen and an intravenous infusion of 50 cc of 25 per cent glucose. There

was no improvement and he died next morning.

The diagnosis was given as acute haemorrhagic enteritis.

The authors discuss the pharmacology of tetrachlorethylene and note that the absence of reported deaths with its use is correlated with its low rate of absorption in the absence of alcohol or fatty substances. They quote a number of cases in the literature in which symptoms of intoxication followed even therapeutic doses but all of these recovered.

The extreme malnutrition of the patient is stressed and it is suggested in the absence of signs of specific aetiology that the chronic diarrhoea was a nutritional diarrhoea and that the small intestine thus involved was especially vulnerable to the effects of tetrachlorethylene.

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The diagnosis was made on clinical grounds, supported by the circumstantial evidence of a local canine and feline population with heavy *Ancylostoma braziliense* infection, a sandy soil, and a high rainfall.

The patients were mostly children between the ages of 1 and 7 years, but there were 9 young adults in the series. Age seemed to make no difference to the response to treatment. "The number of active larvae [presumably lesions] ranged from one to considerably more than a hundred on a single patient."

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Lt E. Napier.

[October 1947]

Tropical Diseases Bulletin

322

FLOCH H & DE LAJUDIE P Sur la filariose à *W. bancrofti* en Guyane française La lymphangite endémique et l'éléphantiasis des pays chauds [Infection by *Wuchereria bancrofti* in French Guiana] *Bull Soc Path Exot* 1947 v 40 Nos 1/2 49-63 [23 refs]

From 1939 onwards these authors have conducted an enquiry into the prevalence of *W. bancrofti* in French Guiana. The blood specimens were taken at 3 p.m. in the day and between 9 and 10 at night in 683 individuals. The measurements of 70 microfilariae in thin blood films were rather smaller than those usually given by authorities but the authors failed entirely to find the embryos either of *Mansonella o zardi* or of *A. persians*. Of the total 253 were not Creoles and except for one European who was infected with *W. bancrofti* they were not studied further. Of the 430 Creoles 165 were soldiers, 54 patients in the general hospital, 137 in the St Denis hospital, 66 children and 8 employees of the Pasteur Institute. 320 were males and 110 females.

All the women were indigenous and had resided in Guiana for 20 years. Among the men there were 70 from Martinique and 33 from Guadeloupe who had emigrated to Guiana in March 1945 but who had been originally infected in their countries of origin. The results for the three different groups are shown in the following table —

From Guiana		Men		From Guadeloupe	
Number	Positive	Number	Positive	Number	Positive
217	27	70	8	33	4
= 12.4 per cent		= 11.4 per cent		= 12.1 per cent	
Total		Women		Total	
Number	Positive	Number	Positive	Number	Positive
320	39	110	20	430	59
= 12.1 per cent		= 18.1 per cent		= 13.7 per cent	

On the whole the number infected tended to increase progressively from 8.2 per cent in the age group 6-20 to 15.3 per cent at 50 years onwards. The youngest was a boy of 12, the oldest a woman of 80. The remainder of this paper concerns itself with the now familiar arguments on the pathology of *W. bancrofti* especially with reference to its rôle in the production of lymphangitis and elephantiasis. P. Manson Bahr

FLOCH H & DE LAJUDIE P Trypanosomiasis et filarioses humaines d'importation en Guyane française Taux d'infestation par *A. persians* chez des tirailleurs sénégalais [Trypanosomiasis and Filariasis imported into French Guiana Infection Rate of *A. persians* in Senegalese Troops] *Bull Soc Path Exot* 1947 v 40 Nos 1/2 17-22 [Refs in footnotes]

The authors report on filariasis found in a unit of soldiers during surveys of blood films made because a case of trypanosomiasis (*T. gambiense*) was found in a soldier of the Antilles Battalion in French Guiana. This man had originally been recruited in French Guiana on the borders of the Ivory Coast where

he was born. A systematic search of 613 Senegalese troops disclosed microfilariæ of *Acanthocheilonema perstans* in 41 (6.6 per cent.), but no other cases of trypanosomiasis were found.

In another series of 111 men, the authors examined blood specimens taken at 3 p.m. in the day and at 9 to 10 p.m. at night. Among 111 troops, 14 or 12.6 per cent. were parasitized with *A. perstans*, but the diurnal blood specimens were more frequently positive than the nocturnal (12 and 7 respectively). No embryos of *Wuchereria bancrofti* were encountered. The figures obtained are considerably lower than those usually given for other parts of Central Africa. Microfilariæ of *A. perstans* were also demonstrated in one European who had been resident six years in French Guiana. The original infection had been contracted in 1936-1938 during a previous residence in the Chad district of Africa. The life-span of *Loa loa* in a European who became infected in Gabon in 1932 is given as 8 years.

P. Manson-Bahr.

WARREN, Virginia G. Studies on Filariasis. V. Serological Relationships between Antigenic Extracts of Four Nematodes. *Amer. J. Hyg.* 1947, May, v. 45, No. 3, 299-301.

Warren *et al.* [this *Bulletin*, 1946, v. 43, 1056] found that two complement fixing antigenic components were present in each of two filarial worms, *Wuchereria bancrofti* and *Dirofilaria immitis*. One of these was group-specific and the other species-specific. Recently, the senior author extended these studies to include *Litomosoides carinii* and *Trichinella spiralis*, and the results of this work are here recorded. The *L. carinii* antigen used was made from adult worms, the *T. spiralis* antigen from dried larvae, extracted by peptic digestion from rat muscle. Stock suspensions of both were made up to a dilution of 1:100 in physiological saline with 0.3 per cent. phenol. Similar extracts were made of *W. bancrofti* and *D. immitis*. Common antigenic components were sought by cross complement fixation tests done with hyperimmune rabbit sera. These sera were obtained by prolonged immunization with suspensions of microfilariæ of *W. bancrofti*, larvae of *T. spiralis* and adult *D. immitis*. For a month, rabbits were given ten injections totalling 2.5 ml. of washed worm-sediment packed by centrifugation, and 5.0 ml. of 1:100 antigen. The rabbits

1:800 and

on 1:4 to

but, as was

expected, with the others as well. *T. spiralis* antigen reacted as well with the *D. immitis* antigen as with its own serum, but the *W. bancrofti* and *D. immitis* antigens reacted with their homologous sera at higher titres. A table shows the titres obtained when *W. bancrofti*, *D. immitis* and *T. spiralis* immune sera were allowed to react with the four antigens diluted 1:200, and indicates that the *D. immitis* immune serum appears to be the least specific, because it reacted to nearly as high a titre with the three heterologous antigens as with its own antigen, while the other immune sera did not.

It appears, therefore, that the complement-fixing group-specific factor common to *D. immitis* and *W. bancrofti* is also present in *L. carinii* of the cotton rat, and in *T. spiralis*, which is not a Filarioid nematode, as are the other species used.

The author briefly records earlier work, most of which has been abstracted in this *Bulletin*, which demonstrated the existence of antigens common to *Onchocerca volvulus* and *Loa loa*; to *L. carinii* and *W. bancrofti*, *O. volvulus* and *L. loa*; and to *D. immitis* and other filarioid nematodes capable of infecting man.

G. Lapage.

[October 1947

in

Tropica -

OLBERTSON J T ROSE H M HERNANDEZ MORALES F OLIVER GONZALEZ
J & PRATT Caroline K The Experimental Chemotherapy of Filariasis
Baneroff Puerto Rico J Pub Health & Trop Med 1946 Dec 22
No 2 139-73 2 pls [Spanish version 174 209]

This is a very comprehensive account of the experimental work designed to find a drug suitable for the treatment of filariasis in man. Much of this work has already been reported in this Bulletin 1944 41 772 1945 42 136 1946 43 34 354

The preliminary tests were carried out with the naturally-occurring filariasis (*Litomosoides carini*) of cotton rats. The most promising results were obtained with neostibosan and neostam. It was shown that these two drugs had little immediate effect on the circulating microfilariae but quickly killed the adult worms. It was assumed that the same thing would occur with human filariasis and therefore less significance was given for much longer periods than in *crofilaria* counts but the cases were followed for much longer periods than hitherto. Neostibosan was first chosen on account of its low toxicity. In the first series the drug was given in the ordinary clinical doses but in subsequent series a more intensive course up to 15.5 gm in 15 days was given. In 23 of 35 patients treated microfilariae disappeared completely and failed to return during a long period of observation (20 months in most cases). In 7 there was a very marked reduction in microfilariae in the blood and in the remainder there was a marked reduction in microfilariae in the blood.

The other drugs used were neostam (11 cases), urea stibamine (6), stibanose (5), iodine (15), anthiomaline (20), tartar emetic (4), and melarsen oxide (18 cases). With each of these drugs a reduction in microfilariae was effected in the majority of cases and with all but foudin at least one case showed the complete disappearance of microfilariae.

Fifteen control cases were followed for 20 months. In none did the microfilariae disappear. In three there was a slight reduction and in 12 there was an increase in the microfilariae counts.

[This paper provides the most complete account of this important work that is at present available.] L E Napier

GABATHULER Maria J & GABATHULER Alois W Report of Onchocerciasis in the Ulanga District (Eastern Province) T T East African Med J 1947 May 24 No 5 188-95

A focus of onchocerciasis is described in the Ulanga District of the Eastern Province of Tanganyika where the infection rate is 39 per cent. A figure obtained by examining 1763 hospital outpatients. The diagnosis was based upon the presence of subcutaneous nodules some of which were excised and were found to contain adult worms and microfilariae. There was a rising incidence of the disease according to age varying from 11 per cent below 15 years to 75 per cent in people over 45.

Dryness of skin and itching were noted in many of the cases and deep abscesses occurred. No definite ocular lesions were observed.

In this locality the altitude range is between 900 feet and 3000 feet. Immature stages of Simuliidae were found in all the streams which are usually fringed by forest. [The diagnosis of onchocerciasis was apparently only established in a minority of the patients and it is doubtful how many of the remainder were really cases of the disease. The authors do not appear to have been familiar with the skin snipping technique the use of which greatly facilitates diagnosis.]

Simulium damnosum is suggested as the local vector, but no identifications were made and *S. nearzi* may well have been, in this locality, the carrier species.]
P. C. C. Garnham.

LINDBERG, K. Enquête épidémiologique sur la dracunculose dans un village de Deccan (Inde). [Epidemiology of Dracontiasis in the Deccan.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 303-18.

As it was found that many cases of dracontiasis attending an ambulance train came from the village of Bhosra in the Deccan (India), it was decided that an epidemiological survey should be carried out in this village. The inhabitants were divided into three groups—(a) those who drank water from eight curb wells, (b) those who drank from the two step wells, and (c) those who lived outside the village. For estimating the population at risk, two years was taken as the incubation period. In group (a), 78 of 379 (20.6 per cent.) males and 34 of 393 (8.7 per cent.) females, or 14.5 per cent. of the total population at risk, were affected; in group (b), 112 of 223 (50.2 per cent.) males, 50 of 202 females (24.1 per cent.), or 38 per cent. of the total population at risk, were affected; and in group (c), 61 of 230 (26.5 per cent.) males, 26 of 216 (12 per cent.) females, or 19.5 per cent. of the total population at risk, were affected.

Of 237 children under the age of 4, only one was affected. Three of 49 children aged 4 were affected, but after this the percentage incidence rises sharply and during the next five-year period 72 out of 247 (29 per cent.) children were affected. In the next five quinquennial periods, the incidence rises to 57.9 per cent.; 68.5 per cent.; 76.8 per cent.; 79.1 per cent.; and 85.6 per cent.; but after the age of 35, the incidence begins to fall and in the 7th decade only 5 of 64 persons were affected.

The number of worms in each individual varied from 1 to 50. The numbers of persons with 1, 2, 3, 4, 5 and 6 worms, were, respectively, 163, 73, 34, 20, 13 and 8. Only 26 persons had seven or more worms, of whom 3 had 23, 25 and 50 worms, respectively.

The number of worms that each individual had in one year was, however, on a smaller scale: only 19 suffered from four or more worms and the figures for one, two and three worms were 220, 76 and 20, respectively. One person had 15 worms in a year.

The number of years that each individual suffered from dracontiasis varied up to 55 years (in one instance). Few (24) gave a history of more than four years' duration: the figures for 1, 2, 3 and 4 years were, respectively, 216, 62, 28 and 10 persons.

The exact point of the appearance of the head of the worm was noted in 758 instances. The detailed enumerations given can be summarized as follows:—

Foot 112; ankle 248; leg 245; knee 60; thigh 50; hip 11; hand (dorsal) 5; wrist 5; forearm 6; elbow 2; shoulder 1; chest 4; abdomen 2; scrotum 6.

The principal intermediate hosts were *Thermocyclops vermifer* I, *Eucyclops serrulatus* hyalinus (Rehberg) and *Thermocyclops* sp.

LINDBERG, K. Dracunculose dans l'état de Djodhpour (Radjpoutana), Inde. [Dracontiasis in Jodhpur.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 318-28.

The State of Jodhpur in Rajputana (India) is one of the most heavily infected foci of dracontiasis in Asia. The numbers of cases treated in the state hospitals

during the years 1937 to 1941 were 258 657 1027 958 and 1297 respectively. The two most heavily infected localities were Vagaur and Didvana which during 1941 showed respectively 256 and 378 cases representing 1.20 per cent and 2.81 per cent of the total hospital attendances. The inhabitants depend almost entirely for drinking water on rain water collected in natural depressions since the well water is often very saline.

The commonest Cyclopidae identified were *Mesocyclops leuckarti* Claus and *Thermocyclops hyalinus* (Rehberg). Others found included *Macrocyclus varicans* Sar. and *M. linyantius* (Keiler). In Didvana in a specimen of *Mesocyclops leuckarti* collected at the beginning of April from an open reservoir (tank) a larva of *Dracunculus medinensis* was found.

From the records of hospital attendance it appears that the months when the largest number of onsets occurs are May to September with July as the peak month in the two towns 90 per cent and 83 per cent of cases occurred in these months.

The question of the factors that determine the seasonal incidence of dracunculiasis was discussed and it was concluded that a high temperature was the important factor. A certain height of temperature is necessary for the development of the larvae in the intermediate host.

L. E. Napier

BURROWS R. B. MOREHOUSE W. G. & FREED J. E. Treatment of Trichuriasis with 'Eneals' of Emetine Hydrochloride. *Amer. J. Trop. Med.* 1947 May, 27, No. 3, 327-38. [12 refs.]

Trichuris infection is not uncommon in some of the Southern United States and is often a problem in mental institutions. No drug hitherto used has proved very satisfactory in the treatment of this infection. *Licbe de higuero* is on effective in the fresh state and its active principle, *Licbe*, has proteolytic properties which make its use undesirable except in small doses.

It was observed that enteric sealed tablets of emetine hydrochloride had some effect on this worm [this Bulletin 1946, 43, 925]. This investigation was undertaken to confirm and extend this observation. Twenty three patients with multiple infections including *Trichuris trichiura* were selected from the inmates of a mental hospital. They were all classed as having dirty habits ranging from a disinclination to wash (100 per cent) to coprophagy (57 per cent). These patients had a total of 150 parasitic infections with 12 different species of metazoan or protozoan parasites, an average of 6.52 species per patient.

A very thorough pre-treatment examination included 3 to 6 stool examinations. Egg and larva counts were also made. Efforts were made to prevent the patients acquiring fresh infections during the course of treatment nevertheless there was evidence that some did acquire fresh infections. Repeated egg counts were made during the investigation the stools were screened for dead worms and in the majority of cases the complete examination was repeated six weeks after treatment was complete. Six different dosages were adopted—

1 gram daily for 12 days—5 patients	
2 grams	6 —5
3	4 —4
3	2 —3
3 in 1 day	—1 patient
5½ grams in 24 hours	

The tablets (eneals containing ½ of a gram each) were given after meals in 15 instances before. No difference in effect was noted.

The drug had a pronounced laxative effect and within 24 to 30 hours, those receiving the larger doses passed mucus, fragments of mucosa and blood. The adult worms were frequently embedded in the detached mucosa. No lasting ill-effects followed and the denuded areas apparently healed without secondary infection. Nausea and vomiting occurred in a few patients.

All six regimens had the effect of removing the majority or all the worms from the lower bowel. The best results were obtained with 2 grains daily, mainly because in the 3-grain group there was a woman who chewed her tablets so that their effect was partially neutralized (she did not vomit). In the 2-grain group, 3 patients had negative stools for 3 weeks, one for ten days, and one had markedly reduced egg counts. In all patients the eggs tended to reappear after 30 days, but in much reduced numbers. The shorter courses, 3 grains for two or one day, were less effective, in only one case was the egg count nil, but in all there was a marked reduction.

In one case (3 grains for 4 days) 2,538 worms were recovered from the stools. In most cases, the worms appeared in the stools within 30 hours, and in all by the 48th hour after the starting of treatment. By the 132nd hour all but one, a very constipated woman, had ceased to pass worms.

There was a distinct effect on the hookworm infections; from the stools of 7 of the 21 infected patients, hookworm ova disappeared for some time, 10 to 28 days, and in all others but two there was a persistent reduction in the egg counts. However, few adult worms were recovered. There was some reduction in the *Ascaris* and *Enterobius* infections but apparently none in the *Strongyloides*.

The flagellate infections were not affected by the treatment, but in 4 out of 5 cases of the first three groups in which *Entamoeba histolytica* cysts had been found, they remained absent from the stools for six weeks.

In 9 of the 15 patients of the first three groups there was a distinct increase in weight, from 2 to 13½ pounds, by the end of six weeks. Twelve showed a reduction in the eosinophil count, averaging 5 per cent., while three showed an increase; the latter had other helminthic infections persisting. No other significant changes in the blood examinations were noted.

It is concluded that emetine by mouth in enteric-sealed tablets is the treatment of choice in *Trichuris* infection.

L. E. Napier.

GELLER, E. R. [Analysis of the Population of *Enterobius vermicularis* in various Portions of the Host's Intestine, and Autoinvasion in Enterobiasis.] *Med. Parasit. & Parasitic Dis* Moscow. 1946, v. 15, No. 5, 45-52. [14 refs.] [In Russian.]

The author records observations carried out with the view to determine the question whether threadworms within the alimentary tract of the host without words, whether autoinfection of the same host subject in view, the

those which were found in the stools; (c) those which were discharged by enemata; and (d) worms removed by dissection of the intestine. The results of this investigation are summarized as follows:—(1) Gravid threadworms which actively crawl out of the rectum contain eggs which are capable of developing outside the host's body, i.e. they are in the gastrula stage in the case of *Passalurus ambiguus* and in the larval stage in the case of *Enterobius vermicularis*; (2) worms which are discharged passively with the faeces contain eggs which are incapable of developing in the external environment; (3) worms expelled with the help of deep enemata contain unsegmented eggs or those which

are in the early stages of segmentation (4) from dissections it is evident that the majority of mature males and females are found in the upper region of the large bowel (5) from these data it is evident that autoinvasion does not occur in *Enterobius* infection

C A Hoare

DEFICIENCY DISEASES

WALTERS J H Dietetic Deficiency Syndromes in Indian Soldiers *Lancet* 1947 June 21 861-5 2 figs

Members of an Indian infantry battalion on active service developed a syndrome characterized by severe wasting chronic steatorrhoea and macrocytic anaemia accompanied by evidence of specific deficiencies of the vitamin B complex. Three-quarters of the force were Jats and one-quarter Rajputana Mussulmans. The former are habitual vegetarians and the latter meat eaters though they tend to be smaller and more slenderly built. The Mussulmans ate a 6-oz meat ration twice or three times a week but in other respects the diets were identical.

The battalion was engaged in the relief of Kohima and from May 17th to August 23rd 1944 remained in this area encircled by swarms of flies and insanitary conditions consequently most of the men developed diarrhoea or dysentery. When the battalion was withdrawn to India on September 1st 1944 126 men out of a total strength of 815 were admitted to hospital with nutritional deficiency.

In this paper 42 of the worst cases are described. Of these only three were Mussulmans the remainder Jats (vegetarian). The illness had commenced two months before withdrawal from the fighting area. The initial symptom was loss of appetite followed by distension after food then diarrhoea with large pultaceous frothy stools. The tongue then became sore. Wasting and extreme weakness rapidly developed. The symptoms appear to have been precipitated by diarrhoea in 6 cases bacillary dysentery in 16 amoebic dysentery in 5 and malaria in 10.

The following syndromes were encountered —

- (1) Gross alimentary dysfunction with steatorrhoea
- (2) Macrocytic anaemia
- (3) Alimentary dysfunction combined with macrocytic anaemia

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hypochlorhydria in 26 per cent
by dried weight were found in

(40 per cent.). This cleared quickly with sulphaguanidine. Sigmoidoscopy in 6 out of 14 cases showed the mucosa much attenuated and dry, sometimes with a strikingly granular surface.

Considerable wasting occurred in 33 cases (78 per cent.), but disappeared with treatment. Macrocytic anaemia was found in 37 cases (90 per cent.), the highest mean corpuscular volume being 161 *cu*. A microcytic anaemia was found in one case. Normocytic orthochromic anaemia was found in 3 cases. Total serum proteins were about 7 gm. per 100 cc, with a low albumin/globulin ratio.

Two changes were seen in the skin, a "crazy pavement eruption" and follicular hyperkeratosis. Peripheral neuritis of a mild degree was present in 64 per cent. and transient acute psychosis developed in 2. Night blindness was seen in 1 and xerophthalmia in another severe case.

Treatment consisted in a high caloric dietary with milk as the main source of protein, liver soup and intensive vitamin therapy with nicotinic acid, riboflavin and liver extracts. Sulphaguanidine was used for those who developed diarrhoea with cellular exudate. Ferrous sulphate, 32 grains daily, was used for hypochromia prior to parenteral liver treatment. Blood transfusion was given in all cases with a red cell count below 2,000,000, and plasma transfusions to five patients with oedema. Two patients died, one of peripheral circulatory failure during a relapse of subtertian malaria, the other of acute pulmonary oedema following a transfusion. The remaining 37 were between 3,200,000 and 4,000,000.

It is pointed out that there were 13 times as many cases of grave malnutrition and anaemia among the vegetarian Jats as among the meat-eating Mussulmans. Bowel infections were important precipitating factors. Hyporiboflavinosis during the recovery phase (which might relapse) is noted as of interest, and conforms to a similar occurrence among civilian internees in Germany after starvation.

It is observed that the syndrome shown by these patients was that of sprue, although the incidence of grave macrocytic anaemia was higher than that in British troops. The active service diet was noted to be adequate, but there was evidence that it was not all consumed; and further, alimentary infection,

P. Manson-Bahr.

SPRUE.

HOWELL, C. A. H. An Early Sign in Sprue. The Split : Unsplit Fat Ratio in the Faeces. *Lancet*. 1947, July 12, 55.

In 1944, 36 cases of sprue syndrome were studied in Karachi: thirty of them were early cases and over half of these had developed within three months of arrival in India. The author found that, whilst the total faecal fat was often within normal limits, in the early stages a significant rise in the split : unsplit fat ratio could be found, especially in those who were put on a fat-free diet.

In 11 patients having a full fat diet (110 gm. daily) there were four whose total faecal fat was below 35 per cent.: in only one was the split : unsplit fat ratio also within normal limits.

In 18 others, having a low-fat diet (16 gm. daily) there were 10 with total faecal fats below their normal (20 per cent.), and of these only two had a normal

ratio, in the eight whose total faecal fat was above 20 per cent the ratio was greatly increased in every case. Hence, in the 14 doubtful cases, the ratio was increased in 11.

In mild cases, response followed 150 mgm of nicotinic acid daily and a low-

fat ratio actually increased further.

The author considers that this rise in the split unsplitted fat ratio in the early stages, and the lag in its return to normal are helpful signs in early or doubtful cases of sprue and in its prognosis. He does not, of course, suggest that this is an infallible test for sprue.

H J O D Burke-Gaffney.

ROBSON J S. Plasma and Corpuscular Cholesterol in Sprue. *Brit J Exper. Path* 1947, Apr. v 28, No 2, 152-60 [29 refs]

The fasting values of plasma and corpuscular cholesterol and cholesterol ester of 5 normal persons and of 5 patients suffering from sprue were compared. Samples of blood were obtained after an overnight fast and each subject then received a meal containing 18 gm of milk fat in 300 cc. Subsequent samples of blood were examined.

increase in the ratio

VENOMS AND ANTIVENENES

EICHBAUM, F W. Hemagglutininas nos venenos de serpentes sulamericanas [Haemagglutinins in the Venom of South-American Snakes]. *Mem Inst Butantan* 1946 v 19, 229-40 [10 refs] English summary

EPHRATI, P. Snakebite Treatment. (Preliminary Report). *Harefuah* Jerusalem 1947 July 1 v 33 No 1 [In Hebrew 2-3 English summary 3]

patient to hospital and provision of blood which are important factors

Hospital treatment should aim at preventing insufficiency of the peripheral circulation, by the intravenous use of normal saline and blood drop by drop. Severe anaemia may occur on the 3rd or 4th day: in such cases, a further blood transfusion may be needed.

The author has found this treatment encouraging in its result and simple in its practice. [Nevertheless, immobilization will not be practicable where the bite is situated other than on a limb: it is hardly to

in delaying the onset of symptoms.

the use of soap injections
H. J. O'D. Burke-Gaffney.

BLANC, G. & DELAGE, B. Contribution à l'étude du venin de *Scorpio* (*Heterometrus*) *Maurus* Lin. Test de toxicité par voie nerveuse. [The Venom of *Scorpio* (*Heterometrus*) *maurus*. Toxicity when introduced by the Nervous Route.] *C. R. Soc. Biol.* 1947, Apr., v. 141, Nos. 7/8, 322-4.

The sparrow is comparatively susceptible to the venom of *H. maurus*; inoculation of one telson or even less proving fatal. Rabbits, on the contrary, resist even large doses, though they may become cachectic and die later; they are not immunized by these doses. *H. maurus* toxin is much less potent than those of other North African scorpions; 5-6 mgm. being needed to kill white mice as compared with $\frac{1}{2}$ -1/40 telson of *Buthus* or *Prionurus*. Compared with snake venoms, 250-300 mgm. of *H. maurus* venom is needed to kill a mouse whereas 0.2-0.25 mgm. of Colubridae or Viperidae venom will kill a man. To test *H. maurus* venom by subcutaneous inoculation, therefore, necessitates the use of a large number of scorpions, so the authors made trial of inoculation directly into the central nervous system, transorbital or transcranial, which produces paraplegia, forced movements, retraction of the head, stiffening of limbs and death.

A standardized emulsion in saline is obtained by grinding up 56 telsons in 15 cc. saline, so that each cc. or "scorpion unit" contains the toxin of 3.7 scorpions. Intravenous inoculation of as much as 5 cc. (18 scorpions) has no effect on a rabbit, but by the transorbital route the venom of 0.5 telson upwards caused death in 1-2 hours, and 0.3 in about 16 hours; 0.2 did not kill but caused nervous symptoms. The degree of immunity, if any, conferred by this method of inoculation is to be the subject of a future study.

H. Harold Scott.

BUECHERL, W. Ação do veneno dos escolopendromorfos do Brasil sobre alguns animais de laboratório. [Action of Brazilian *Scolopendromorpha* Venom on Laboratory Animals.] *Mem. Inst. Butantan.* 1946, v. 19, 181-97, 10 figs. English summary.

The author studied the venom of the five Brazilian species of *Scolopendromorpha* in mice, guineapigs and pigeons. He found that the principal effects were great pain, redness and some superficial necrosis, which absorbed within 1 to 3 weeks without leaving a scar.

As a result of these experiments, the author is satisfied that the venom of the two common Brazilian centipedes *Scolopendra viridicornis* and *S. subspinipes*, when injected by an occasional bite, is too feeble to cause any serious toxicity or danger to life in human beings, whether adults or children.

H. J. O'D. Burke-Gaffney.

DERMATOLOGY AND FUNGUS DISEASES

BONNE C. Over blastomycosen in het bijzonder die van Indonesie [Blastomycoses in Indonesia] *Med Maandblad Batavia* 1947 May No 10 186-94

The term mould is one of very diverse significance and moulds are very polymorphic organisms. In medicine mould diseases are classified largely

species and the reaction produced is of the nature of a specific granuloma. In this review the author adopts the classification (Brumpt) of the human parasitic moulds into (1) *Hyphomycetes* (Fungi imperfecti) whose filaments form simply through detachment or through developing spores or form conidia (2) *Ascomycetes* in which the spore formation develops in definite organs or asci and (3) *Phycomycetes* with a non-septate mycelium capable of sexual reproduction by fertilization of ova. The separate disease conditions and their causal parasites under these headings are—*A. HYPHOMYCETES* (1) *Cryptococcus hominis* the cause of Busse-Buschke blastomycosis (2) *Torulopsis histolytica* of torulosis of brain and meninges (3) *Phialophora verrucosa* of chromoblastomycosis (4) *Trichosporium pedrosi* of chromoblastomycosis

(5) *Histoplasma farciniformum*

(7) *Endomyces dermatitidis*
nefaciens of so-called yeast

Coccidioides immitis of

coccidioid blastomycosis affecting lungs, meninges, skin and bones (10) *Paracoccidioides brasiliensis* of coccidioid blastomycosis affecting lymph nodes, intestine and skin (11) *Rhinosporidium seberi* of rhinosporidiosis. There follow *serialim* descriptions of the histological appearances of each of these lesions and of the symptomatology. Examples of many of them though not all have been recorded in Indonesia. B. F. Harvey

CALERO M. C. Madura Foot (Mycetoma). First Report from the Isthmus of Panama. *Arch Dermat & Syph* 1947 June 1 55 No 6 761-71 6 figs [Refs in footnotes]

SALAZAR LEITE A. & BASTOS DA LUZ J. Contribuição para o estudo das esporotricoses na provincia ultramarina de Moçambique [Sporotrichoses in Mozambique] *An Inst Med Trop* Lisbon 1946 Dec 1 3 187-94 10 figs on 5 pls [Summary in English by the author]

Attention is called to the existence of sporotrichosis in Mozambique. After a short clinical description of a case in a negress observed at Lourenço Marques (Miguel Bombarda Hospital) the respective mycological study is

In this were found
of fibro-angiomatosis
have not yet been

described in that mycosis. Such a curious fact is registered which in no way invalidates the clinical diagnosis at first made and later confirmed by the cultural examination.

FEREBEE S. H. & FURCOLOW M. L. Histoplasmin Sensitivity among Siblings. *Pub Health Rep* Wash 1947 June 6 62 No 23 834-47 5 figs

This paper which should be read in the original is a statistical study of the familial incidence of sensitivity to histoplasmin amongst white children between

the ages of 1 and 19 years, resident in Kansas City Mo. and its environment, based on figures from the investigation on more than 16,000 children undertaken by FURCOLOW, HIGH and ALLEN [see *Bulletin of Hygiene*, 1947; v. 22, 36]. The association of "histoplasmin sensitivity" with individual family groups could be taken to suggest the operation of genetic, broad environmental (social, economic, geographic, etc.) or specific environmental factors localized in the home (common food supply, household pets etc.)

The inclusion of many family groups of 2 to 7 members provided the opportunity to study the incidence of the histoplasmin reaction amongst siblings, but, in view of the proved importance of the geographical factor, the study was or its neighbourhood. there was a similarity e same family and the proportion of reactors was higher in those family groups in which the elder sibling was a reactor than in those in which the elder sibling was not a reactor. This difference, however, became less marked with the higher age groups. Closeness of age in siblings also influenced the similarity of reaction. After making allowance for the influence of the important factors, geography, age, sex and race, there remained a factor which determines that the siblings of a reactor show a greater tendency to react with histoplasmin than the siblings of

J. T. Duncan.

LAM, F. K. & PRICE, S. Histoplasmosis in Man. *Hawaii Med. J.* 1947, May-June, v. 6, No. 5, 313-15.

"A human case of histoplasmosis, diagnosed at autopsy by the discovery of the causative organism in the tissues, is reported.

"So far as is known, this case was acquired in the Territory of Hawaii.

"This is believed to be the first case of histoplasmosis diagnosed in Hawaii."

WHIMS, C. B. Coccioidial Meningitis. *Bull. U.S. Army Med. Dept.* 1947, May, v. 7, No. 5, 466-71.

It has been estimated that the central nervous system or its meninges is involved in 25 per cent. of the cases of fatal, disseminated, coccidioid granuloma. The author describes two cases, in which apparent localization of the

The coccidioidin skin reaction was absent in one case and only feeble in the other. X-ray examination showed, in one case, signs of internal hydrocephalus, probably caused by lesions of the membranes at the base of the brain; and, in the other, a complete blockage at the level of the 5th cervical vertebra which, from biopsy, was found to be caused by dense adhesions between the three membranes, and a granulation tissue with pearly nodules on the dural surface suggesting tuberculosis. Bodies resembling the spherules of *Coccidioides immitis* were seen in sections of these nodules and in the cerebrospinal fluid of the other case, but their identity was not clearly established and all attempts to cultivate the fungus failed.

The evidence in favour of the part played by Vincent's fusio-spirochaetes is weighed and discussed and the relevant literature quoted at length. It is concluded on the basis of evidence to date that the ulcers are probably caused by these organisms in a host made susceptible by vitamin B deficiency and probably further debilitated by chronic disease and general malnutrition. The rôle of dietary deficiency and various predisposing diseases is noted and the author observes with admirable caution that the aetiology remains a complex problem which has not yet been finally settled.

In discussing differential diagnosis it is pointed out that a positive clinical or laboratory diagnosis cannot always be made with certainty, especially in the mentions some of the many other conditions which further confusion by confining of the commonest lesions which require to be distinguished, namely desert scur, cutaneous diphtheria, pyogenic ecthyma, cutaneous leishmaniasis and aphthous gummatosis. These are summarized adequately.

On the subject of treatment the wide variety of therapy proposed in the past is referred to. Most agree that general medical principles apply here, i.e. with local antiseptics, debridement and rest the ulcer will eventually be cleaned up. The search has been for the antiseptic that would be rapidly effective in all cases. The relative values of copper sulphate, Bipp, zipp and

author records the successful treatment of Vincent's infections of the mouth—gingivitis, angina and noma—with penicillin and quotes similar successes in the case of tropical ulcer. This Bulletin 1946, 43, 95.

immediately and penicillin was discontinued. A week later on an adequate diet alone healing continued. Other treatments were then instituted which

ate. The
the lesion
stages are
superb

results of other investigators and his own experiences the author believes that penicillin will probably become the treatment of choice in the active phase of tropical ulcers. The chronic stage requires surgical treatment.

It is greatly to be regretted that the results of treating only a single case are given since they are insufficient to support the author's conclusions regarding

penicillin. The author has, however, treated a large amount of cases and that he has done so with such thorough and critical a balance is not only welcome as a summary in itself but is also a timely reminder that such an overhaul of the wood and the trees alike was long overdue. This careful paper should be read in the original by all practitioners in the tropics. H. J. O. D. Burke Gaffney

MISCELLANEOUS DISEASES.

GELFAND, M. Symmetrical Gangrene in the African. *Brit. Med. J.* 1947, June 14, 847-9, 2 figs.

Six cases of symmetrical gangrene are described in Africans from Southern Rhodesia. In four, the gangrene was limited to the toes and in two was more extensive. The patients were all males, of whom five were aged between 20-35; the other 55.

Oedema was the first sign, followed by the symmetrical gangrene, becoming moist in one case. No common cause could be found for the gangrene. It is suggested that these cases bear the closest resemblance to "Bilateral gangrene of the digits in the young" described by Lewis (1936, *Vascular Disorders of the Limbs*) or the gangrene in the extremities recorded in prisoners of war in the Far East. The paper is illustrated by two photographs.

Clinton Manson-Bahr.

SALTER, J. G. Symmetrical Gangrene in the African. [Correspondence.] *Brit. Med. J.* 1947, July 19, 103-9. [13 refs.]

An account of a case in an Ethiopian [see above].

HALL, G. A. M. Tropical Eosinophilia or Pulmonary Acariasis. *Brit. J. Tuberculosis* 1946, Oct., v. 40, No. 4, 124-9. [13 refs.]

Eosinophilia in tropical patients associated with chronic pulmonary symptoms and radiological mottling of the lungs, the condition responding to treatment with organic arsenical drugs, is now well known under the name tropical eosinophilia; in several cases, mites have been found in the sputa of such patients, and have been suggested to be the cause of the disease. The first patient described in the present paper presented this syndrome and was successfully treated with carbarsone. The second patient differed in that he had no history of residence in the tropics, and mites were not demonstrated in his sputum; he had, however, worked in a dusty fruit store, and the author believes that his condition was essentially the same as tropical eosinophilia. [See also WILSON, this *Bulletin*, 1947, v. 44, 851].

F. Murgatroyd.

JACOBY, H. The Toxic Effect of Teora (Khesari) on Man. Protection of the Public by Legislation and Conversion of Teora into Fodder. *Indian Med. Gaz.* 1947, Mar., v. 82, No. 3, 122-5.

Teora and Khesari are two of the many synonyms of *Lathyrus sativus* [and probably other species of *Lathyrus*]. The toxic principle of *Lathyrus* has not been isolated and some at least of the symptoms of lathyrism may be due to a contaminating mould such as causes threshers' disease [see *Bulletin of Hygiene*, 1947, v. 22, 121] and belonging to the *Alternaria*, the *Gibberella*, or the ascomycete *Chaetomium*. The fungi do not grow on fresh wheat grains but only on wheat which has been lying on wet fields or is stored in the wet. During the months February-July, when the fresh teora crop is eaten, lathyrism does not occur, but after the onset of the July monsoon, when the grain is damp, the eating of it from August onwards is followed by appearance of cases. Symptoms develop after about a month on such food, so the peak of the disease is in September and October. Persons in some houses are attacked, those in others escape because some families are more careful to store the grain in a dry place. Apparently the fungus is harmless to animals, in fact is a valuable nutritious food for them. The author suggests that teora should be prohibited as food for man and be made unsuitable by unpalatable adulteration; that the Government should buy up the entire crop and, after such adulteration with linseed

illustrated by examples. The whole of this part by its clarity of exposition goes to show that the author must be in the front rank of teachers. Part V gives precise instructions on laboratory techniques, cultivation, staining etc. used in parasitology. Throughout the work are valuable keys for identification of genera and species.

The whole is clearly printed on good paper with adequate margins and spacing. Misprints are few and obvious so that no real harm results from them. It is a book which has produced the binding work one wishes to read. In sum, the object for which the work was written—instruction of the worker in South America—has been fully attained.

H. Harold Scott

КОЖЕННИКОВ П. В. ДОБРОТВОРСКАЯ В. В. & ЛАТЫШЕВ Н. И. [Cutaneous Leishmaniasis: a Treatise for Physicians and Biologists] (State Publishers of Medical Literature) 371 pp. 126 text figs. 1947. Moscow. In Russian. 132 00 Roubles.

Cutaneous leishmaniasis is widely distributed in the Middle Asian republics of the Soviet Union and to a lesser degree in Transcaucasia. In some areas this disease is a veritable scourge producing severe epidemic outbreaks especially among non immune newcomers (settlers, troops etc.). During the recent war the endemic regions were visited by many people from the European part of U.S.S.R. with the result that numerous cases of infection appeared among them. The re-evacuation of these people served to spread the disease throughout the Union and in view of the long duration of some forms of oriental sore such cases are likely to be encountered outside the endemic areas for some years to come by medical practitioners many of whom have no experience of this disease and are further handicapped by the lack of a reliable guide to the subject. This gap has been filled by the present monograph which gives a comprehensive account of all aspects of cutaneous leishmaniasis. Written jointly by two clinicians and a parasitologist it serves the practical needs of the physician and epidemiologist and at the same time provides a theoretical background for the parasitologist and zoologist. Many of the data given in this book are original being based on investigations carried out in recent years by the authors and their associates.

An introductory chapter deals with various types of cutaneous leishmaniasis of which the authors recognize at least three: the South American mucocutaneous form and two forms encountered in Middle Asia and probably in other localities as well: the dry or late ulcerating form and the moist or early ulcerating form. In discussing the nomenclature used in cutaneous leishmaniasis the authors suggest that the archaic terms used to describe the lesions (e.g. sores, boutons, ulcers etc.) should be abolished and replaced by a new term, leishmanoma, to denote any lesion developing at the site of inoculation of the infection while secondary lesions resulting from dissemination

Among the causative organisms of cutaneous leishmaniasis the authors recognize, in addition to *L. brasiliensis*, two morphological varieties of *L. tropica*: *L. tropica* var. *major* and *L. tropica* var. *minor*, which were created by YAKIMOFF [see this *Bulletin*, 1915, v. 6, 225]. The former variety is said to be responsible for the "moist" type of oriental sore, while the latter causes the "dry" type.

In the succeeding section an exhaustive account is given of the clinical course of cutaneous leishmaniasis. First a description is given of the characteristic features of the two types encountered in Middle Asia [for a summary of these see this *Bulletin*, 1944, v. 41, 331]. These are compared with the forms of the disease occurring outside the Soviet Union, after which the features common to all variants of oriental sore are described. This section also deals with the diagnosis of oriental sore and includes a short account of muco-cutaneous leishmaniasis. This section is followed by chapters on histopathology and immunity in cutaneous leishmaniasis, including various serological reactions used in the diagnosis of the disease and the practice of vaccination. Experimental infection of mammals is also described in this section, while the following is devoted to treatment and deals very fully with chemotherapy, immunotherapy

reservoir hosts of the "moist" type of the disease [this *Bulletin*, *loc. cit.*], a detailed account is given of the ecology and of incidence of leishmanial infection in these rodents. As regards the "dry" type, man is thought to be the chief source of infection. This section also deals with transmission and comprises an account of the anatomy, life-history, ecology and systematics of sandflies. The last section is devoted to prophylaxis and control of cutaneous leishmaniasis, with a description of measures directed against the rodents and sandflies as sources of infection, on the one hand, and measures for protection of the human host, on the other. In an appendix instructions are given for the collection and preparation of sandflies. The monograph is adequately illustrated, but unfortunately some of the figures have suffered in reproduction. There is an extensive list of literature, arranged according to subjects, but a subject index is lacking.

The authors are to be congratulated on producing the first monograph on cutaneous leishmaniasis which covers the whole subject in a comprehensive manner. Its value to medical practitioners and to research workers cannot be overestimated, for it serves not only as a practical guide to the diagnosis and treatment of the disease but also provides material for the study of problems requiring further investigation.

C. A. Hoare.

LEWIS'S MEDICAL, SCIENTIFIC & TECHNICAL LIBRARY. Supplement to the Catalogue of Lewis's Medical, Scientific and Technical Lending Library, including a Classified Index of Subjects with the Names of those Authors who have treated upon them. Supplement, 1944-1946.—pp. iv+176. 1947. London: H. K. Lewis & Co. Ltd., 136, Gower Street, W.C.1. [To subscribers 2s. 6d.; to non-subscribers 5s.] [Review appears also in *Bulletin of Hygiene*.]

The latest edition of Lewis's Library Catalogue, revised to the end of 1943, was published in 1944. The present Supplement relates to the 3,300 books added to the Library from January 1944 to December 1946, in which period the Library's scope has been greatly extended (the lower volume at a time),

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R L Sheppard

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TROPICAL DISEASES BULLETIN.

Vol. 44.]

1947.

[No. 11.]

SUMMARY OF RECENT ABSTRACTS.*

IX. LEPROSY.

General.

In the *Revista Brasileira de Leprologia* (p. 451) is an account of the classification of leprosy, in which many suggestions were made by different workers. These cannot be set out in detail here, and no agreed conclusions were reached. ARNOLD and TILDEN (p. 452) suggest a classification into two forms only, lepromatous and tuberculoid, the latter including the so-called "neural" forms. COCHRANE (p. 1146) gives his opinion that tuberculoid lesions do not become lepromatous.

Epidemiology.

BLOSS (p. 656) reports on leprosy in the southern Sudan where, in 1935, it was estimated that 7 per cent. of the population were affected. A large settlement has been in existence for many years, and has been useful for the segregation of infective patients in special camps. Chaulmoogra has proved valuable. The diminishing numbers found in recent years, and the fact that the proportion of patients below the age of 20 is diminishing, suggest that the disease is being brought under control.

In a leprosy survey of part of the Belgian Congo, DEGOTTE (p. 340) found incidence rates varying from 2 to 6 per cent.; the highest incidence was in persons aged 30-40. Most of the lepromatous cases are now segregated in this

incidence is now so
not much more than 0.6.

DHARMENDRA (p. 452) shows that the humid province of Bengal has a high leprosy rate, up to 3 per cent., and estimates the number of cases at 200,000-300,000. For these there are only 7 indoor institutions, with 786 beds, and 150 out-patient clinics. Isolation of infective patients, therefore, is not nearly adequate.

SHLIMOVITZ (p. 750) has found a few cases of leprosy, obviously old-standing, in the mountainous interior of New Guinea, where the disease had not previously been seen, though well known on the coast.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

IBARRA PÉREZ and GONZÁLEZ PRENDES (p. 563) give an account of leprosy in Cuba where the known incidence is 0.53 per 1,000 and the probable incidence considerably higher. The same authors (p. 933) have written of the incidence of leprosy in Cuba according to race. They make the point that any differences in racial incidence are due rather to economic causes than to racial susceptibility.

An enquiry held in the Philippines by DOULL *et al.* (p. 453) indicates that the risk of acquiring lepromatous leprosy is highest for persons exposed to infection before the age of 5 years and decreases progressively as the age at time of exposure increases. This is true for both males and females but there is also strong evidence that males at all ages are more susceptible than females to

greater than among the general population.

TRESALACIOS and GONZÁLEZ PRENDES (p. 934) have traced the earliest symptoms and calculated the probable age at infection of 315 patients in Havana. In 63 per cent the symptoms appeared first before the age of 25 and the average was 23 years with probable first infection some 5 years earlier. Most of these patients had lepromatous disease.

CANAAN (p. 340) quotes his own long experience of leprosy to emphasize the low degree of infectivity of this disease: new infections are rare after the age of 30-35.

MOISER (p. 454) contends that cockroaches may play some part in the transmission of leprosy in S. Rhodesia and gives reasons for his opinion.

Ætiology Pathology Clinical Findings

MONTIEL (p. 1152) describes Macchiavello's method of staining leprosy bacilli. In staining the leucocyte layer of citrated blood some of the bacilli are stained but some are not. He suggests that the latter presumably lacking a waxy coat may be the infective forms. He makes the point that blood for examination should be drawn from a vein by puncture where the skin is normal. By staining blood in this way positive results are usual in lepromatous disease but never in tuberculoid and nerve cases.

MONTIEL *et al.* (p. 454) note that leprosy bacilli are found in large monocytes of the blood and that these are more numerous in blood taken under pressure from the ear. They are also easily found in the leucocyte layer of centrifuged citrated venous blood.

ROW (p. 1147) claims to have cultivated the leprosy bacillus from a nodule in haemoglobinized saline to which a culture of *Leishmania* was added and thereafter on agar and glycerinated potato.

HASSELLTIVE (p. 457) comments on the frequent presence of acid fast organisms which are not leprosy bacilli in the skin and states that the most reliable method for demonstrating leprosy bacilli is to scrape a skin incision after the method advocated by Wade repeated in a second area of skin and to rely only on finding the typical bundle arrangement. CAMPOS and SOUZA (p. 47) discuss the difficulty in diagnosis sometimes encountered between leprosy and syphilis of the skin. The Wassermann reaction is important if negative but it may be positive in leprosy. Biopsy with discovery of the
is decisive

ARGÜELLO PITT and CONEJOS (p. 849) found leprosy bacilli in the lesions of 8 of 78 patients with tuberculoid leprosy. Six were in the state of reaction, two were not.

TAYLOR (p. 342) has found leprosy bacilli in the wall of the gall bladder, and in the edges of ulcers of the large intestine, in a case of leprosy. The gastrointestinal and biliary tracts are generally supposed to escape infection.

TILDEN (p. 455) shows that in lepromatous leprosy the reticulo-endothelial system is especially involved. The nodules are predominantly composed of histiocytes, and the globi are large or fused histiocytes. Liver and spleen commonly show minute foci in which the reticulo-endothelial tissues are similarly involved. The lungs are the least affected of the internal organs. In 16 autopsies, tuberculous complications of leprosy were found in 7.

Skin from tuberculoid leprosy is about as active as normal skin.

GONZÁLEZ PRENDES and IBARRA PÉREZ (p. 226) have attempted an assessment of the duration of leprosy. The average duration, in 270 cases, was 23 years, with extremes of 3 and 56.

ARNOLD (p. 751) gives a description of the lesions of lepromatous leprosy, and compares them with those of neural leprosy. The prognosis of the two forms is ve

PRABHU Nasal infections :

they are rare in simple macular leprosy, but not uncommon in major tuberculoid disease. The course of these lesions is described, and an account is given of leprosy of the mouth, pharynx and larynx ; the last may necessitate tracheotomy on account of the oedema which often occurs.

Leprotic laryngitis is found only in lepromatous disease, and commences with great thickening of the epiglottis ; spread to the vocal cords produces stenosis which requires operative relief. SLOAN (p. 460) discusses tracheotomy for this condition, it quickly relieves the stenosis, but although many patients continue to wear a tube for years, there is a fairly heavy mortality rate, deaths being due, largely, to the general condition which made the operation necessary.

CERRI (p. 749) examined blood, bone marrow, gland juice and nasal mucus from a series of leprosy patients. Anaemia, almost always hypochromic, was common. Leprosy bacilli were found in the marrow and glands in some of the lepromatous and mixed cases. Details of the findings should be sought in the original.

GRUENFELDER and LASCH (p. 1148) discuss the effect leprosy may have on the sexual organs, and relate these to the effects on the olfactory system. They think that there is some connexion between the two systems, but it is not clear.

HARLEY (p. 1148) describes the lesions of ocular leprosy as he has seen them in 150 cases in Panama, where 90 per cent. of patients show some ocular involvement, and where the only patients free from this are in the early stage of the disease. More than half the cases are of severe involvement, interfering with sight. The disease affects chiefly the anterior segment. Conjunctivitis is common, but the cornea is the most vulnerable part, being involved in 87 of the 150 cases ; the lesion was usually superficial keratitis. The iris is also vulnerable, and iritis, or its sequelae, was observed in over half the cases. Fundus changes were not found. Treatment of these conditions was largely confined to palliative measures. CHORINE (p. 564) remarks that various authors have given very different estimates of the incidence of ocular lesions in leprosy, but that most of them agree that the longer the duration the commoner the ocular complications, and that they are more frequent in lepromatous than in neural

leprosy. He uses a mixture of acetamide and sulphanilamide in water, injected round the circumference of the orbit, in the treatment of ocular complications, and claims good results. The injections are painful and a local anaesthetic is necessary. Details of this treatment should be sought in the original paper.

esters of chaulmoogra (Neochaulmestrol). As a rule, improvement followed weekly injections of 1.5-2 cc., and the authors think that some of the value may be due to the emulsion used.

com-ophthalmic ganglia for relief of ocular pains in leprosy, after preliminary local anaesthesia. The operation evidently needs great care and skill, but the author quotes 6 cases in which the procedure was successful in relieving pain, photophobia and lachrymation. The lachrymal glands are often infected, and their extirpation removes one focus of infection and, according to AMENDOLA (p. 225), leads to improvement of other ocular lesions, if these are present.

Tests

In considering a series of lepromin tests of persons not suffering from leprosy, of whom some had and some had not lived in leprosy countries, BECHELLI *et al.* (p. 225) think that the delayed reaction does not necessarily indicate latent infection, but may be the result of allergy to the lepromin injected 3-4 weeks before. The early reaction, also, does not necessarily indicate infection or sensitization to lepromin, but, in the authors' opinion, may be due to sensitization by the tubercle bacillus. COVIT *et al.* (p. 457) tested tuberculous and other persons with lepromin, in New York where leprosy is not endemic. A considerable number of positive results were obtained, which indicate that infection with the tubercle bacillus may produce sensitivity to lepromin.

<p>cases F se C A L L L</p>	<p>1) discusses the old form but relates original lepromin of that the devised a reaction of real</p>	<p>2) subject of allergy in leprosy, it is best lepromin reaction and the tuberculinoid of the allergic state. This paper Araujo, and of ordinary lepromin in accord in ation reaction an antigen patient in lepro the prep a pro d</p>	<p>of patients leprosy, which is nolized red ulation is y and uc value antigen sera from ne results ions, the</p>
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test is not satisfactory for diagnosis. The same authors (p. 850) found that complement in sera of leprosy patients was within normal limits.

DUEÑAS and ABAD (p. 935) quote results of several tests (including the Rubino test) in leprosy. They remark that when the results for leprosy tests, and tests for syphilis, are both positive, there is probably a dual infection of leprosy and syphilis.

Treatment.

MUIR (p. 654) draws a comparison between lepromatous leprosy and filarial elephantiasis as regards septic infection and the development of pachydermatous conditions, in both cases associated with lymphatic obstruction and periodic inflammatory changes. Sepsis, and possibly allergic reactions, may be the cause of lepra reactions, which may be controlled by promin or diasone. These, and penicillin, probably act by their effect on septic infection.

FAGET and POGGE (p. 343) report further on the use of promin in leprosy, recording the results so far seen in 137 cases. Routine treatment consists of 3 to 5 gm. injected intravenously each day, six days each week, for courses up to 2 weeks, with intervals of one week between courses. The longer the duration of treatment, and the higher the doses (within toxic limits), the better the results; improvement is recorded in up to 72.5 per cent. of certain categories. Promin is not

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MUIR (p. 458) has treated a series of lepromatous patients with diasone, either injected intravenously or given by mouth. Details of dosage are given in the original abstract. The results are very encouraging, especially in those

together.

LIMA and CERQUEIRA (pp. 47, 226) report very favourably indeed on the treatment of lepromatous leprosy with "Soluthiazamide" given intravenously.

FAGET and POGGE (p. 460) state that penicillin has no curative action on the essential lesions of leprosy; on the other hand, GUILLEN PRATS and GOMEZ LUCAS (p. 936) give an account of a patient with severe lepromatous disease, who was greatly benefited by a course of penicillin, which, incidentally, caused febrile reactions after the early injections.

PEREIRA (p. 609) has written a book on the treatment of leprosy, as he has given it in Goa. In general he finds that chaulmoogra gives the most certain results, but that there is a place for Reenstierna's serum, vaccines, venoms, vitamins and other substances for certain types of disease.

GUICHARD (p. 343) describes a simple method of preparation of esters of the fatty acids of *Hydnocarpus anthelmintica*; details are given in the original abstract.

MONTEL (p. 344) writes favourably of Charpy's method of treatment of lupus (with vitamin D, calcium gluconate and milk), applied to leprosy, but reports only two cases.

The use of leprostatics which affects more than half of the ambulatory patients in the trunk produced by the use of leprostatics by administration of heat and intravenous oil locally on chronic

proliferous ulcers of nervous system into the femoral artery twice or thrice each week

FENNEL (p 458) quotes two cases in which removal of initial skin lesions by surgical means was apparently entirely successful. In comment ROGERS makes the point that such successful excisions support the modern view that the entry of the causative organisms is by punctures of insect bites. Vaccines prepared from an acid fast organism. He has used this vaccine in prophylaxis from a leprosy hospital in India. DOW (p 460) points out that few of the stresses the advantages of

or the release of leprosy patients from well known institutions and these should be sought in the original source and period of freedom from the same subject giving details of treatment at the various stages and the institutional discharge (with continued progressive steps to be taken by observation) and definitive discharge. Details should be sought in the original abstract. FIOL (p 848) suggests that even definitive discharge should not be absolute but should be subject to annual revision. GARZÓN and ARGUELLO (p 849) discuss the whole subject of discharge.

FIOL (p 848) stresses the difficulties which face discharged patients in the institutions in India related to

Control

in the control of the suffering parents, it is possible in many dangerous cases. The point is made that the use of leprostatics at the breast is rather voluntary than compulsory. The use of leprostatics (p 1153) has traced the last provision of which is rather voluntary than compulsory.

Rat Leprosy

FIELDING (p 1147) holding that infection in rat leprosy is largely the result of excretion of the organisms in urine and faeces examined the faeces of a number of leprosy patients and found numerous acid fast organisms. He has inoculated

rats with such faeces, dried, and subsequently has found acid-fast bacilli in the rats, both locally and internally. He considers that patients excreting acid-fast bacilli are dangerous carriers. He (p. 1154) has published further work in support of his contention that rats become infected with rat leprosy through contact with soil contaminated by the organisms shed by infected rats in urine and faeces.

PRUDHOMME (p. 657) describes a test to decide the vitality of rat-leprosy bacilli maintained dry, *in vacuo*, at 0°-4°C. for long periods.

Charles Wilcocks.

RABIES.

CECCALDI, J., PAQUIER, P., TRINQUIER, E., PELISSIER, A. & VARGUES, R. Présence en Afrique équatoriale française d'un virus rabique des rues d'origine équine naturellement renforcé. [A Rabies Street Virus of Naturally High Virulence in a Horse in French Equatorial Africa.] *Ann. Inst. Pasteur*. 1947, June, v. 73, No. 6, 589-91.

At the end of 1945, the authors, working at the Pasteur Institute in Brazzaville, isolated a street virus from the brain of a horse which died within 12 hours of showing symptoms suggesting rabies. A few Negri bodies were found in sections of the brain, and brain tissue emulsified in glycerin produced, on intracerebral inoculation of rabbits, a virus of short incubation period which behaved like a fixed virus.

On isolation, this virus killed rabbits on the 10th and 15th days. After the first rabbit passage, death took place on the eighth day, after the second, on the seventh day, and after the third, on the sixth. Up to September 1946, 24 successive passages had been maintained. The virus has been transmitted to guinea-pigs, a dog and to mice. The virus was finally identified by cross-immunity tests with known rabies virus.

The authors therefore classify this virus among the viruses of naturally high virulence (*naturellement renforcés*); they suggest that these findings, following their previous records of human rabies in French Equatorial Africa, call for rigorous veterinary control and prophylactic measures.

The high virulence of this strain confirms the opinion given by REMLINGER in 1928, that rabies virus and the disease of rabies behave in the tropics in a manner analogous to that in which they behave in Europe.

H. J. O'D. Burke-Gaffney.

REMLINGER, P. & BAILLY, J. Action de la streptomycine sur le virus rabique. [Action of Streptomycin on Rabies Virus.] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 17/18, 327-8.

Having already found that penicillin was without action on rabies virus, the authors describe experiments to test the effect of streptomycin on the virus.

Streptomycin solution was used to emulsify brain tissue from a rabbit containing fixed virus. The mixture was inoculated into dogs, but all of them developed rabies, which indicated that the virus was resistant to streptomycin.

The authors suggest that the dual resistance of rabies virus to streptomycin and to putrefaction might be put to good use in the examination of brain-specimens from biting animals, which so frequently arrive in the laboratory in a bad state of putrefaction. This suggestion is supported by a description of an

experiment in which a badly contaminated specimen was emulsified with a solution of streptomycin and inoculated into cats. The cats developed rabies but became sterile. The original specimen had been rich in bacterial flora but became sterile. The cats developed rabies without any signs of accompanying bacterial infection. The authors note that in some of these experiments the streptomycin was used to avoid toxic reactions soon after the injection of the streptomycin. The authors describe the methods which they employed in further experiments to avoid these accidents.

H J O D Burke-Gaffney

REMLINGER P & BAILLY J. Action du suc d'Agave sur le virus rabique (Action of Agave on Rabies Virus). Arch Inst Pasteur d'Algérie 1947 June v 25 No 2 87-8 also in C R Acad Sci 1947 Apr 21 v 224 No 16 1133-4

Agave contains a proteinase and the authors have studied its action as a vegetable enzyme on rabies virus in analogy with such an action known to be produced on the virus by enzymes of animal origin.

Two species were studied: *Agave americana* var *folius variegatis* and *A. attenuata* Salzm. In each case juice expressed from the leaf parenchyma was cleared and mixed with an equal volume of a 1:50 emulsion of rabbit brain containing fixed virus. Various adjustments of pH were tried. After 17 hours in the dark at 15° the mixtures were inoculated under the dura of rats in the case of *A. americana* (0.1 cc) and mice in the case of *A. attenuata* (0.2 cc). The emulsion mixed with equal parts of water was used as a control in each case.

Tables indicate that between pH 6.6 and pH 11 juice from both species of Agave destroyed the virus *in vitro* and all the animals survived. The control animals died of rabies [in the first table the control mixture is shown as suc d'agave + eau].

Juice from two aloes and from some commercial papains failed to destroy the virus.

The authors state that these two species of Agave should be added to the long list of organic substances (of animal origin) which can destroy rabies virus *in vitro* and that results support the argument in favour of a protein nature for rabies virus.

H J O D Burke-Gaffney

RIETZ J H. Rabies in the Fox. J Amer Vet Med Ass 1947 Aug v 111 No 845 138-9

The author examined the brains of 14 foxes in northern West Virginia in connexion with an outbreak of rabies among these animals. Negri bodies were found in 10 of them in the 4 negative cases the animals may have been killed too soon for Negri bodies to form. Brief clinical notes are given of each case from which it is clear that in contrast with the normally retiring disposition of the fox in the presence of human beings and dogs these animals were fearless and aggressive and attacked with an abnormally marked show of bravery.

The author notes that a number of those persons reporting the attacks had observed that the foxes were just too brave to be normal and he points out that in his own experience the outstanding and constant symptom of rabies in domestic and wild animals has been this change in behaviour and disposition. Any fox showing a marked change from its normal behaviour should be considered a rabies suspect especially where the disease is enzootic.

H J O D Burke-Gaffney

HABEL, K. Ultraviolet Irradiation in the Production of Potent Antirabies Vaccines. *Pub. Health Rep. Wash.* 1947, May 30, v. 62, No. 22, 791-800. [11 refs.]

The author has made a rabies vaccine by the method of Oppenheimer and Levinson [see this *Bulletin*, 1944, v. 41, 914]. This consists of passing a suspension of virus-containing tissue in a thin film in front of an ultra-violet lamp with a high percentage of emission below 2,000 Å. Mouse and rabbit brain emulsions in concentrations of 5 to 20 per cent. were run through the apparatus and given the minimum exposure to ultra-violet light necessary to produce complete inactivation (0.7 second). Vaccine produced by this method protected mice against 340,000 MLD of active virus, whereas phenolized vaccines protected against a maximum of 13,000 MLD only. The potency of the irradiated vaccine was equally high when made from the concentrated brain suspension. Potency was largely lost after storage for 6 months at 4°C., but was retained in the presence of 0.5 per cent. phenol or chloroform. Some slight protection was also conferred upon guineapigs which had received active virus before the beginning of vaccination.

A similar technique of radiation was carried out with an ordinary low-pressure resonance lamp in place of the special Oppenheimer lamp. Vaccines prepared thus were equally potent, showing that the essential feature of Oppenheimer's method lies in irradiating the material in a thin film, and not in using a lamp with emission below 2,000 Å.

D. J. Bauer.

MALARIA.

WENGER, R. Das vermehrte Auftreten autochthoner Malaria in Wien. [Increase of Indigenous Malaria in Vienna.] *Wien. klin. Woch.* 1947, Feb. 21, v. 59, No. 7, 106-8. [12 refs.]

Malaria among persons, especially the older women, who have not been beyond the town and its suburbs has shown an increased prevalence of late years. Between 1922 and 1944 the number of cases annually did not exceed ten. In 1945 there were 30; in 1946, 140. Of these last, 83 were autochthonous. The greatest number occurred in the hot months of the second quarter of the year. *A. maculipennis* appears to be the chief vector; possibly also *A. bifurcatus* and *A. nigripes* [presumably *A. plumbeus*]. The causes assigned are returned infected persons, the hot weather and the large number of susceptibles. After the first world war, there was a much greater incidence among the civilian population; in successive years from 1917 to 1923 the figures were 14, 32, 3,717, 321, 85, 7 and one.

H. Harold Scott.

HERNBERG, C. A. The Epidemiology in Malaria Tertiana in Finland during the Years 1941-1945. *Acta Med. Scandinavica.* 1947, v. 127, Nos. 3/4, 342-60, 8 figs. (1 map). [36 refs.]

During 1945 there were some 1,252 cases of primary malaria recorded in Finland, all *P. vivax* infections.

Malaria is no new disease in Finland. Severe epidemics were recorded in the two absent. inst the re were ing years, lsthms

suffered most but cases also occurred in East Carelia. Soldiers carried infection to the southern parts of the country where there were civilian cases. 75 in 1942, 53 in 1943 and 17 in 1944.

The author obtained detailed information about 868 of the 1202 cases notified in 1945. Only 12 of them were women. All patients were between the ages of 15 and 53; there were 345 in the 20-25 age group. The cases were scattered all over the country. It was impossible that infection could have been acquired in the patient's home districts; in some areas temperatures were too low for transmission to have taken place. May was the month of maximum incidence. The vast majority of the patients had been in the Carelian Isthmus in the previous autumn and it would seem almost certain that the outbreak was due to infections acquired some nine months previously.

The author found that an early summer epidemic provided fewer cases of

WILSON, D. Bagster. Malaria in Madagascar. *East African Med J* 1947 Apr 1, 24, No 4, 171-6.

Madagascar was occupied by British forces from 1942 to 1945 and during the first landings a very high incidence of malaria occurred among the troops, 29 per cent becoming infected. Simple control measures were begun and the rates dropped in successive years: 28 per cent in 1943, 9 per cent in 1944 to 3 per cent in 1945.

A survey of the indigenous population around Diego Suarez revealed a high degree of hyperendemicity. The parasite rate in children between one and five years old was 81 per cent; between six and ten years, 93 per cent; and in adults, 40 per cent. The spleen rates were about the same. *P. falciparum* was the dominant species, although *P. malariae*, *P. vivax* and *P. ovale* also occurred. The gametocyte rate at the end of the malaria season was 16 per cent, but this dropped to 3 per cent at the beginning of the next season. Other parts of the island are less malarious and at Fianarantsoa the parasite rate in 98 children was only 10 per cent.

A. gambiae is distributed throughout Madagascar but in all the higher country *A. funestus* is the chief vector. The maximum density was 19 anophelines per hut. In addition to a number of mainland species, two new *Anopheles* were discovered: *A. radama* de Meillon and a second [*A. fuscicollis* van Someren]. 1,573 mosquitoes were dissected and sporozoites were found in 5.6 per cent *funestus* and 4.0 per cent *gambiae*. P. C. C. Garnham.

RAO, R. B., RAO, H. R. & SUNDARESAN, B. Epidemiology of Malaria in the Tungabhadra Project Area of the Ceded Districts of Madras. *J. Malaria Inst. of India* 1946 Dec 1, 6, No 4, 323-57, 1 map & 3 charts.

The ceded districts of the Madras Presidency, Bellary, Anantapur, Cuddapah and Kurnool lie between the States of Mysore and Hyderabad and abut on the Bombay Presidency. Much of the area is covered with black

against famine the Tungabhadra Irrigation Project was evolved. The scheme consists of the construction of a dam across the Tungabhadra River. Water from the resultant lake, some 30 square miles in extent, would be used to irrigate some 600 square miles of country containing 312 villages in the event of a failure of rains. The survey reported in this paper was carried out

so that malaria control measures might be put in hand before the project was initiated.

Spleen examinations were made in all 312 villages. In only 68 villages was there evidence of endemic malaria, though the whole district was liable to epidemic malaria following seasons of abnormal rainfall. Sixteen species of *Anopheles* were collected as adults, larvae or both. The ubiquitous *A. culicifacies* is considered to be the chief vector; in certain parts of the area *A. stephensi* plays a part in malaria transmission. *A. culicifacies* is most prevalent in November and December, the malaria season. In the restricted area in which *A. stephensi* transmits the disease, the malaria season is somewhat later. Blood smears of children showed the relative prevalence of parasite species to be, *P. malariae* 39.2, *P. vivax* 30.4, *P. falciparum* 30.4 per cent.

Norman White.

DE BURCA, B. Malaria in Fort Sandeman. *J. Malaria Inst. of India*. 1946, Dec., v. 6, No. 4, 359-65, 4 figs. on 2 pls., 1 graph & 1 map.

Fort Sandeman is the chief town of the Zhob District in the north-east of Baluchistan. It lies in the Zhob Valley on an open plain 4,700 feet above sea-level, three to four miles east of the Zhob River. The cantonment contained some 2,000 troops and the attached bazaar had a population of about 3,500. 445, here is the terminus as a floating population; year. The climate is dry; piped water supply comes from the Siliaza Valley, 9 miles away, and water for irrigation, in a partly cement channel, comes from the same source. About 1928, the prevalence of malaria attracted attention, in September 1932, the malaria admission rate was 191 per thousand. Over-irrigation and neglect of irrigation channels was thought to be responsible.

The systematic capture of mosquitoes in 1940 yielded *A. culicifacies* 10,379, *A. stephensi* 6,804, *A. pulcherrimus* 24, *A. superpictus* 160, *A. turkhudi* 115, *A. dhali* 149, *A. sergenti* 15 and *A. fluviatilis* 13. Of 10,330 *A. culicifacies* and *A. stephensi* caught in May and June only 6.7 per cent. were males. Larval control in the cantonment, bazaars and Apozai was adequate at the time and it appeared that the majority of the catch was coming from the Zhob River 3 to 3½ miles from the nearest military lines. In the Zhob River, intense breeding of *A. stephensi* was found. In May 1945 the author revisited Fort Sandeman.

been very much reduced.

Norman White.

HARPER, P. A.; LISANSKY, E. T.; SASSE, B. E.; DOWNS, W. G.; OMAN, P. W.; CHRISTENSON, L. D.; LEVINE, N. D. Malaria and other Insect-borne Diseases in the South Pacific Campaign, 1942-1945. A Series of Four Papers. I. General Aspects and Control Measures [HARPER, LISANSKY & SASSE]. *Suppl. to Amer. J. Trop. Med.* 1947, May, v. 27, No. 3, iii+1-67, 1 map, 3 charts & 9 figs. [22 refs.]. II. Epidemiology of Insect-borne Diseases in Army Troops [DOWNS, HARPER & LISANSKY]. *Ibid.* 69-89, 12 graphs. III. Entomology [OMAN & CHRISTENSON]. *Ibid.* 91-117, 5 figs. IV. Parasitological Observations on Malaria in Natives [LEVINE & HARPER]. *Ibid.* 119-28, 1 fig.

This Supplement to the *American Journal of Tropical Medicine* contains four papers by officers of the Medical Corps or Sanitary Corps of the United

States Army Together they constitute a comprehensive survey of the incidence of malaria in the United States Forces and of the malaria control programme are more briefly discussed

Malaria caused more than five times as many casualties as did combat in the South Pacific area during World War II Other insect borne diseases the South Pacific The most severe epidemics were experienced in Elate and Guadalcanal where the maximum monthly incidence was 2 678 (April 1942) and 1 781 (November 1942) per thousand per annum respectively Severe but lesser outbreaks were experienced in Espiritu Santo Tulagi Florida Russell Islands and Munda New Georgia There was no serious outbreak in either Treasury Island Bougainville Island Green Island or Emirau Island these were the last four bases to be occupied Early in the campaign the urgent military situation and shortage of supplies coupled with a lack of appreciation of the magnitude and gravity of the malaria problem precluded effective anti malaria measures The subsequent development of the South Pacific Malaria and Insect Control Organization is described it achieved remarkable results

In view of the extensive literature concerned with the important part played by mepacrine in the control of clinical malaria in the South Pacific it is interesting to read It cannot be emphasized too strongly that the control of malaria in the South Pacific resulted from the reduction of anopheline mosquito populations because of field control measures on all malarious bases (p 68) Field control measures directed against disease bearing insects are the basis of any sound program Suppressive measures of varying value (p 69) [This statement action are auxiliary to the contribution of mepacrine to the allied victory] hardly does justice to the only important malaria vector in the South Pacific area *Anopheles farauti* *A. punctulatus* *A. lugae* *A. koliensis* and *A. nataliae* were rarely sufficiently numerous to play any important rôle moreover they are all zoophilic except *A. koliensis* which is markedly anthropophilic seems possible that there are two races of *A. farauti* on Guadalcanal domestic and wild the latter in captivity does not feed readily on man *Aedes aegypti* was responsible for dengue outbreaks in New Caledonia Elate Espiritu Santo and Tulagi Florida *Aedes scutellaris* may at times transmit dengue

In the Polynesian islands filariasis is transmitted by *Aedes pseudoscutellaris* in the New Hebrides and Solomons the vectors are anopheline chiefly *A. farauti* and probably *A. koliensis* Nocturnal periodicity of microfilariae was noted on Guadalcanal Espiritu Santo and Emirau but not in Samoa or Fiji Scrub typhus was encountered in Espiritu Santo Bougainville and Munda (New Georgia) Only on Bougainville was there evidence of any considerable reservoir of infection [Many of the results of investigations recorded have been published elsewhere but these papers do much more than record results they present an area wide perspective of the elaborate malaria control programme It is a remarkable story of very great interest] Norman White

DAVEY D G Concerning Exoerythrocytic Forms and the Evidence for their Existence in Human Malaria. Trans Roy Soc Trop Med & Hyg 1946 Oct 40 No 2 171 82 [30 refs]

This suggestive paper should be read in the original in order to obtain a clear idea of the problems and forms of the human mal - the potential existence of exo-erythrocytic situation is reviewed chiefly from

the chemo-therapeutic angle, and only species associated with this work come

exist only during short and special periods in the infection—as is the case with some of the avian parasites.

Indirect evidence is very strong. The Cairns work of FAIRLEY *et al.* [this *Bulletin*, 1945, v. 42, 630; 1946, v. 43, 527] demonstrated a constant negative blood phase following the inoculation of very large numbers of sporozoites (except for the half-day following injection), and the author assumes from this, that wherever else the sporozoites develop, they do not develop in the red blood corpuscles. [This is perhaps not absolutely certain—it is just possible that they may be in the erythrocytes hidden in stagnant sinuses of the body. Compare, for instance, the behaviour of the ordinary schizont of *P. falciparum* and more particularly the slowly developing crescent.]

The evidence from therapeutic experiments is striking. Plasmoquine, prosectasine and paludrine all act as causal prophylactics, unlike the other anti-malarial drugs, and these three substances are known to have a special action on the exo-erythrocytic forms in avian malaria. Then there is the curious difference in the effect of quinine on blood-induced and sporozoite-induced *P. vivax* infections—effective with the former and not on the latter.

Finally, the author quoted the probable number of generations of pre-erythrocytic parasites in different species—*P. gallinaceum* 2 (or 1), *P. cathemerium* 2; not more than 3 in *P. falciparum* and not more than 4 in *P. vivax*.

P. C. C. Garnham.

DUBIN, I. N. Bodies suggesting Exoerythrocytic Forms of *Plasmodium vivax* in Tissue Culture. *Proc. Soc. Exper. Biol. & Med.* 1947, June, v. 65, No. 2, 154-6, 4 figs. [12 refs.]

Tissue cultures were made of sternal bone marrow obtained from patients who had been bitten four to six days earlier by mosquitoes infected with *P. vivax*.

In one culture, four days old, bodies resembling exo-erythrocytic forms were found in the macrophages; 50 oval and round bodies around a central nucleus were seen in one cell, and in a second, a "cluster of segmenters" with a central core.

[The paper is illustrated with four photo-micrographs, but without seeing the actual preparations, it is impossible to give an opinion about the nature of these bodies. The author himself judges them conservatively.]

P. C. C. Garnham.

MASILLAMINI, S. G. Premature Rupture in Schizogony; an Explanation for Multiple Infection of Red Blood Corpuscles with Malaria Parasites. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 107-10.

Multiple infection of red blood cells are common in malaria, particularly in *P. falciparum* infections, and are usually considered to be the result of several merozoites penetrating the erythrocyte. Binary fission is an alternative explanation and superficially appears to be likely, because strands of cytoplasm connecting the two parasites are sometimes visible. The author puts forward the theory that such appearances are due to invasion of the cell by two incompletely separated merozoites from a malformed schizont. The connecting strand may then either disappear or remain. [This is an interesting supposition and fits in well with the facts. "Ragged" schizonts are particularly common in

upper Sur Dar ya and in the village of Dzhulek some 60 miles south of Kzrul Orda further down the river *Anopheles maculipennis* Mg was common in the town where it attacked man and var *sacharovi* Favr. was the most numerous Anopheline in the village. The larvae and pupae of this variety occurred in many types of water and were commonest in rice-fields and the adults congregated in dark corners in cattle sheds and stables. The females fed almost exclusively on cattle and horses but rarely attacked them outdoors. Very few were observed in dwellings and they did not attack man indoors. Fewer females were released in rooms in which many people were sleeping than were recaptured in the morning in the same unfed condition whereas 80-100 per cent of those taken in a cattle shed near by contained blood. *A. hyrcanus* Pall. which readily attacked man was the next in abundance in the village but did not occur in the town. Only single adults were taken in animal quarters and the majority concentrated on the windows and walls on the sunny side of houses. *A. algeriensis* Theo. was rare but readily attacked man after sunset in woods in water meadows six larvae were found in June among reeds in water with a temperature of 17.2 C [63 F]. Two engorged females of *A. pulcherrimus* Theo. were taken on the railway station at Kazalinsk and a few of *A. superpictus* Grassi along the railway line both had probably been accidentally brought by train. *A. claviger* Mg (*bifurcatus* auct.) was not found though it had been recorded from the area previously. Observation showed that the adults of *A. algeriensis* flew little more than half a mile from their breeding places while *A. m. sacharovi* and *A. hyrcanus* covered distances of up to 5 miles. Malaria was not epidemic in the areas surveyed and was rare in some parts.

WHITE R Senior On Malaria Transmission in East Central India Further Data J Malaria Inst of India 1946 Dec v 6 No 4 469-68 [14 refs]

Between 1937 and 1943 the author either alone or with collaborators published ten papers giving the results of mosquito dissections which determined the malaria vectors over an area of some 170,000 square miles served by the Bengal Nagpur Railway. This area includes the Hazaribagh Ranges Orissa Coastal Plain and the Coastal Area around the Chikla Lake the present paper gives the results of further extensive dissection work carried out since previous publication. A newly investigated area in the Southern Central Provinces is briefly reported on. Here *A. fluviatilis* was the only species found infected in 1943. Norman White

TOFFALETTI J P & KING W V Some Records of Mosquito Dissections in Northern New Guinea J National Malaria Soc 1947 Mar v 6 No 1 32-6

Sporozoites of malaria parasites were found in the salivary glands of two specimens of the intermediate form of the *punctulatus* series of *Anopheles* among 138 gland dissections of specimens of this form collected in native villages in the Hollandia area of northern New Guinea. This is the first record so far as known of infection in this form which was the predominating one in

these villages. Gland examinations of 12 specimens of subspecies *punctulatus* and 36 *farauti* (formerly known as *moluccensis*) were negative. No infections were found in a series of 119 *A. karwari* obtained from a military camp located several miles from any native village.

"*Filaria* infections were found in the thoracic muscles or head of 20 of 203 specimens of the *punctulatus* series, or an infection rate of about ten per cent. Seven of the specimens (representing each of the three forms) contained matured larvae. Six individuals among 268 *Armigeres? obturbans* and one among 13 *Aedes (Aedes)* sp. contained immature filariae in the thoracic muscles. Small numbers of nine other culicine species were negative."

VARGAS, L. El *Anopheles darlingi* Root, 1926 en Mexico. [*Anopheles darlingi* in Mexico.] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1946, Dec., v. 7, No. 4, 221-6. [10 refs.] [Summary in English by the author.]

"*Anopheles (Nyssorhynchus) darlingi* Root, 1926 is one of the most dangerous vectors of malaria in the New World; was found in British Honduras and Guatemala by Komp (1940), in the border of Guatemala and Mexico by Kumm, Bustamante and Herrera (1943, 1943a) and now is reported from Teapa, Tabasco. As this late locality is within a zone going from Tampico, Tamaulipas to Champoton, Campeche, it is probable that the geographical distribution of the species is larger than actually reported."

ZERMATI, M. & VARGUES, R. Concentration alexique du sang au cours du paludisme aigu. [Concentration of Complement in the Blood during Acute Malaria.] *C. R. Soc. Biol.* 1947, Apr., v. 141, Nos. 7/8, 406-7.

A number of workers in the past have recorded a diminution, and even an actual disappearance, of complement during the course of malaria, and its more or less rapid restoration after cure of the disease.

The authors have studied the complement levels in 120 patients suffering from malaria: of these infections, 37 were *P. vivax*, 75 were *P. falciparum*, 6 were double infections of these two species and 2 were caused by *P. malariae*.

They conclude that the complement titre corresponds with the clinical state, falling during the disease and returning to normal upon recovery. In severe, and especially comatose, cases, persistent absence of complement, despite treatment, indicated a fatal termination; conversely, a progressive rise in titre preceded cure. In benign attacks, the curve differed in primary infections and relapses: in the former case, the titre rose slightly until the 5th day and then fell; in relapses, the curve varied inversely with the temperature.

They also observed a difference in the complement in relation to the species of parasite: the decrease in complement was slight in *vivax* infections, but very marked in the case of *falciparum*. There appeared to be some relation between the degree of parasitaemia and the complement concentration. There was also a parallelism for believing

phenomenon, protein disequilibrium. They believe the "*hypoalectie*" to be brought about by a double mechanism—disturbance of complement formation and complement fixation *in vivo*; arguments, based on experiments, are given in support of this view. They finally conclude that among the infective diseases malaria, like other conditions due to blood parasites, belongs to a group of "*affections hypoalectiques*", having the dual mechanism suggested above.

H. J. O'D. Burke-Gaffney.

ENGSTROM, W. W., GORDON, H. H., MARBLE, A. & BRUNSTING, H. A. Induced Malaria of Foreign Origin. *Arch. Intern. Med.* 1947, Feb., v. 79, No. 2, 185-202, 6 figs. [Refs. in footnotes.]

This report concerns 243 patients. 175 were white and 68 negroes. For this purpose 4 strains of *P. vivax*, 3 from the Mediterranean area were used. Mosquito transmission was attempted in 101 white patients and 23 Negroes: 99 per cent. of the white patients were successfully infected, but only 17 per cent. of the Negroes. Seventy-one patients were inoculated with blood containing trophozoites of the same strains of *P. vivax* and 48 Negro and 3 white patients were inoculated with blood containing a Trinidad strain of *P. malariae*.

The prepatent and incubation periods of *P. vivax* malaria averaged about 2 weeks when mosquitoes, and 5 days when blood inoculations, were used in the transmission of infection. Sixty-five per cent. of patients infected by mosquito-bite with Pacific strains of *P. vivax* had relapses: no relapse was observed among patients who had been inoculated intravenously with blood containing the same strains.

P. malariae infections had a tendency to cause serious renal complications.

Norman White.

BELTRÁN, E. & SANDOVAL C., A. Reducción controlada del periodo de incubación en las inoculaciones artificiales con *Plasmodium vivax*. [Controlled Reduction of the Incubation Period in Artificially Induced Infections by *Plasmodium vivax*.] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1946, Dec., v. 7, No. 4, 255-64, 2 graphs. Summary in English by the authors.

"The relative influence of blood groups and number of parasites inoculated in artificially induced infections by *Plasmodium vivax*, were investigated in relation to the incubation period. Both factors are important, but the former has more importance than the latter. The incubation period, using incompatible bloods, even with large inocula of near 400,000,000 parasites, was never shorter than 5 days. Using compatible bloods and inocula with 100,000,000 or more parasites, the incubation period was one day only in 50 per cent. of the cases; from one to two days in 75 per cent.; and of no more than three days in all cases. From the viewpoint of economy, and in order to facilitate the hospital or nursing care of malariotherapy cases, it is advisable to use as a routine therapeutic measure, inoculation with compatible bloods, and with not less than 150,000,000 parasites."

BRAITHWAITE, P. Some Observations on Blood Transfusion in a Highly Malarious Area. *Med. J. Australia.* 1947, June 14, v. 1, No. 24, 725-6.

The author, who served in a military Forward Surgical Unit in the Aitape-Wewak area, discusses his considerable experience of blood-transfusion of casualties in a malarious area. A "transfusion" in this case is defined as a unit of 1 litre, when stored blood was used, and 1,400 ml. when the blood was taken from local donors. All the malaria which occurred was subtertian; the rare *P. vivax* infections were always accompanied by *P. falciparum* as well. Five methods of suppressing, minimizing or preventing malaria after blood transfusion were studied, namely (1) the use of stored blood from non-malarious areas, (2) selection of donors apparently free from malaria, (3) premedication of donors with mepacrine, (4) administration of large quantities of mepacrine to the recipients, (5) routine treatment of malaria after transfusion.

The first step was abandoned when all the 8 transfusions given in the field were followed by rigors. The blood was obtained from Sydney and despite good air communication and packing in ice the blood was severely shaken in its transit from the hospital to the field. It was necessary to store it for longer than a week at temperatures well above 4°C .

Donors were selected as far as possible from those who had never suffered from overt malaria and who showed a negative thick blood film but there was little doubt that most of the troops in the area had suppressed malaria. Hence when possible all donors were given 0.3 gm of mepacrine four hours before their blood was taken in addition to their routine suppressive doses. In practice this was not always feasible in a forward area where donors and an urgent casualty often arrived together.

Experiments showed that the mean mepacrine level in the plasma of 100 men who had taken 0.1 gm daily for 6 weeks was 21 microgrammes per litre and this was usually sufficient to suppress malaria. In those who had taken 0.2 gm daily the level was 42 microgrammes per litre with an additional dose of 0.3

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parasites. The casualties themselves received 0.5 gm of mepacrine by mouth on admission and again the next morning. Transfusion usually took place in the interval. Where necessary the intramuscular route was employed.

These measures were fairly satisfactory when the weekly malaria rate was low. For example in March 1945 the rate was 0.4 per 1000 and 0.2 gm of mepacrine was being taken daily. Nine transfusions were given and one man

despite
14 out

sualties
pointed

out that previous experimental work has been concerned with transfusion of non malarious patients from malarious donors. In active service under highly malarious conditions the seriously wounded are themselves likely to be more potentially malarious than the donors.

Following the failure of solely suppressive measures these were accompanied thereafter by routine malaria treatment of the patient either immediately before or after the transfusion. When this was done none of the further 27 patients transfused developed overt malaria. It is stated that despite the disadvantages of indiscriminate treatment in these cases it not only prevents malaria but also acts as a tonic for those casualties on the brink of a malarial attack.

RAYMOND W. D. Totaguina and its Rivals *East African Med J* 1946
Oct v 23 No 10 301 10 12 figs

In this paper read before a Branch of the B.M.A. at Dar es Salaam the lecturer describes the preparation of totaguina carried out there during the war from indigenous supplies of cinchona bark. Brief mention is made of the introduction of this bark to Europe and to its use in the treatment of malaria. Quinine accounts for 40 per cent of total alkaloidal content in the commoner species

of cinchona and came to be regarded as the most suitable of these alkaloids in the treatment of malaria before the advent of synthetic drugs. Subsequent work has shown that the dominant position of quinine arose by chance rather than on account of intrinsic merit. In order to make available a cheap preparation in which the other alkaloidal constituents of cinchona bark could be employed, the Malaria Commission of the League of Nations recommended the preparation of totaquina. It was included in the B.P. of 1932, where it was defined as a mixture of cinchona alkaloids containing at least 70 per cent. which were crystallizable, not less than 20 per cent. of these being quinine. Two preparations of totaquina came alkaloids of a suitable bark, and amount of quinine was added. 7.

free bases. The product prepared in Dar es Salaam had the following composition: quinine 40 per cent.; cinchonidine, 20; cinchonine, 10; quinidine, 1; amorphous alkaloids, 20; moisture and ash, 9 per cent. The difficulties met with in the erection of a plant for commercial preparation with the aid of local resources are outlined. By the end of 1942, about 640 lb. of totaquina had been produced and in 1945 the annual output was 8,500 lb., which was used to supply neighbouring territories in East Africa. Steps are still being taken to improve the quality of the product. Whether it will be able to compete successfully with the newer synthetic products which are dealt with in the lecture will probably depend largely on local conditions.

J. D. Fulton.

GORDON, H. H., DIEVAIDE, F. R., MARBLE, A., CHRISTIANSON, H. B. & DAHL, L. K. Treatment of *Plasmodium vivax* Malaria of Foreign Origin. A Comparison of various Drugs. *Arch. Intern. Med.* 1947, Apr., v. 79, No. 4, 365-80, 2 charts. [Refs. in footnotes.]

The drugs used in this series of observations were: quinine sulphate, 16 or 30 gm. over a period of 7 or 14 days, quinacrine hydrochloride (mepacrine), 3.2, 2.6 or 1.2 gm. over a period of 7, 6 or 1 days; SN 6911 (3-methyl-4-[4-diethylamino-1-methylbutylamino]-7-chloroquinoline)—both the bisulphate and dinaphthoate salts of SN 6911 were used, 3.2 gm. over a period of 7 days; chloroquine, 2.0, 0.8, 1.0 or 1.2 gm. over a period of 6, 6, 1 or 3 days; and SN 8137 (4-[3-diethyl-amino-2-hydroxypropylamino]-7-chloroquinoline), 2.0 gm. in 3 days. In all cases relatively large doses were given on the first day of treatment.

All the patients were white soldiers who had contracted *P. vivax* malaria in either the Pacific or the Mediterranean area and who suffered from relapse (or delayed primary attack) while under observation in the Harmon General Hospital.

All the synthetic drugs were effective in controlling fever and parasitaemia, in which respect they are superior to quinine sulphate. Minor toxic symptoms were few. Neither SN 6911 nor chloroquine showed any superiority over quinacrine in preventing relapse, and there are indications that SN 8137 will prove to be equally ineffective in this respect. None of the three newer drugs causes the skin discoloration that quinacrine does. They may, therefore, be valuable substitutes for quinacrine in treatment of the acute attack, especially in the few patients who have a sensitivity to the latter drug.

Norman White.

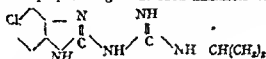
RUSSELL, B. Mepacrine Eruptions. A Case in the British Isles. *Lancet.* 1947, Aug. 9, 205-6.

DAME L R. The Effects of Atabrine on the Human Visual System *Amer J Ophthalm* 1946 Nov \ 29 No II 1432-4

Apart from minor and temporary scotomas and blind-spot-enlargement which occurred when high blood mepacrine levels were suddenly attained, no visual changes were found during brief or prolonged administration of the drug to volunteers
H J O D Burke-Gaffney

ACHESON R M KING F E & SPENCER P C Benziminazoles related to Paludrine [Correspondence] *Nature* 1947 July 12 53

The differences in activity of paludrine recently noted by HAWKING [this *Bulletin* 1947 \ 44 648] when it is added directly in solution to tissue cultures of *P. gallinaceum* and *P. cynomolgi* and in the sera of animals treated with the drug led him to suggest that the substance had been activated *in vivo*. The present authors have prepared a guanidinobenziminazole of the formula —



which from considerations of spatial relationships might have been formed from paludrine in the body by the loss of two hydrogen atoms. Benziminazole derivatives are moreover known to inhibit the growth of certain micro-organisms. The new substance resembled paludrine in chemical properties including the formation of a copper complex [see this *Bulletin* 1947 \ 44 283]. However it and related compounds proved inactive against *P. gallinaceum* infections in chickens and the conversion of paludrine in the body to either of the synthetic substances prepared can therefore be excluded. J D Fulton

KOEPLI J B MEAO J F & BROCKMAN J A Jr An Alkaloid with High Antimalarial Activity from *Dichroa febrifuga* [Correspondence] *J Amer Chem Soc* 1947 July \ 69 No 7 1837

[See this *Bulletin* 1947 \ 44 699]

BERNSTEIN J STEARNS Barbara DEXTER M & LOTT W A I Derivatives of Aminopyridines *J Amer Chem Soc* 1947 May \ 69 No 5 1147-50
[Refs in footnotes]

BERNSTEIN J STEARNS Barbara SHAW E & LOTT W A II Derivatives of 2,6-Diaminopyridine *J Amer Chem Soc* 1947 May \ 69 No 5 1151-8
[Refs in footnotes]

BERNSTEIN J PRIBYL E J LOSEE Kathryn & LOTT W A III Some Substituted Sulfanilamidopyridines. *J Amer Chem Soc* 1947 May \ 69 No 5 1158-60

CURD F H S DAVIS M I HOGGARTH E & ROSE F L Synthetic Antimalarials. Part XV. Some Aryloxy- and Arylthio-dialkylaminoalkylamino-pyrimidines *J Chem Soc* 1947 June 783-90

CURD F H S LANDQUIST J K & ROSE F L Synthetic Antimalarials. Part XIV. Some 2 Arylamino-4-aminoalkylaminoquinazolines. *J Chem Soc* 1947 June 775-83

ELDERFIELD R C FREMER C B KUPCHAN S M BIRSTEIN O & CORTES Gloria Synthesis of certain 8 (5-Alkylamino-1-methylpentylamino)-Derivatives of Quinoline *J Amer Chem Soc* 1947 June \ 69 No. 6 1258-60
[Refs in footnotes]

DE MENDONÇA, F. C. & CERQUEIRA, N. L. Insects and other Arthropods captured by the Brazilian Sanitary Service on Landplanes or Seaplanes arriving in Brazil between January 1942 and December 1945. *Bol. Oficina Sanitaria Panamericana*. 1947, Jan., v. 26, No. 1, 22-30.

The first phase of the campaign for the eradication of *Anopheles gambiae* from Brazil extended from 1939 to 1941, and complete success was achieved. This report concerns the second phase of the campaign, which commenced in 1942 and is still continuing. The inspection and fumigation of all aeroplanes arriving in Brazil from Africa is compulsory, not only because of the possible reintroduction of *A. gambiae* and other disease vectors, but also because of the numerous agricultural pests of Africa which might become established.

The authors give a brief account of the transfer of the organization from the Malaria Service to the Brazilian Quarantine Service, the methods of inspection and spraying, and then summarize, in three tables, the results of four years' work.

In the first table, the figures are given for the total number of arthropods encountered in flying-boats and land-planes, classified by families or orders (the mosquitoes being classified by genera and species). The figures add up to many thousands, including 352 *A. gambiae* and 4 *Glossina palpalis*.

The second table gives the numbers of machines which arrived each month, and indicates the numbers of those with *A. gambiae* on board. The greatest numbers of *A. gambiae* were found in August (21), September (75) and October (163) in 1943.

The number of aeroplanes from which arthropods, either dead or alive, were recovered between 1942 and 1945, is analysed month by month in the third table. This number (8,287), emphasizes the importance of this campaign for the prevention of the introduction of harmful insects into the country from Africa.

H. S. Leeson,

TALIAFERRO, W. H. & TALIAFERRO, Lucy G. Asexual Reproduction of *Plasmodium cynomolgi* in Rhesus Monkeys. *J. Infect. Dis.* 1947, Jan.-Feb., v. 80, No. 1, 78-104, 7 figs. [24 refs.]

P. cynomolgi usually produces a non-lethal infection in rhesus monkeys which is characterized by a tertian periodicity. Both in blood- and sporozoite-induced infections, two broods of parasites often co-exist and these may be recognized by the numerical preponderance of the various stages. Unfortunately, the multinucleate forms and mature schizonts are usually rare in the peripheral blood. Segmentation under American conditions occurs between 7 and 9 a.m. on alternate days.

The normal picture is usually as follows—

Acute rise . . . 5th to 7th day.

Peak and slow decline . . . 8th to 12th day.

Developed infection . . . for a further week or longer.

Latency . . . several months.

Relapses.

These periods are accompanied by changes in the rate of asexual reproduction, thus . *Acute rise*—Maximum number of merozoites, low death rate of parasite, normal length of asexual cycle, *i.e.* 48 hours. *Peak*—lowest number of merozoites, high death rate of parasite, extended cycle of more than 48 hours. *Developed infection*—Merozoite numbers returning to normal, high death rate of parasite, cycle again 48 hours.

The survival rate may be as high as 100 per cent. during the acute rise and it may sink to 1 per cent. in the developed infection. The . . . differs from

animal to animal and according to the amount of inoculum, but, in general, resembles the above description.

The chief difference between blood and sporozoite infections was in the length of the pre-patent period—3-7 days in the former and 9-11 days in the latter.

The authors compare these phenomena with *P. brasilianum*, *P. cathemersum* and *P. floridense* infections and note the greater resemblance to the last two. They suggest that the cause of the changes in the asexual cycle at the crisis is probably the presence of some parasitocidal substance in the serum.

P C C Garnham

INDIAN RESEARCH FUND ASSOCIATION REP SCIENT ADVISORY BOARD FOR
YEAR 1ST JAN TO 31ST DEC, 1946 9-14 Mammalian Malaria Enquiry
under the Director, Central Research Institute, Kasauli.

The malaria enquiry was undertaken in India with the object of discovering in *Plasmodium cynomelgi* of rhesus monkeys an exoerythrocytic cycle of development comparable with that occurring in avian and saurian malaria. The enquiry at the end of December 1946 had been in progress 18 months but no evidence had been obtained that an exoerythrocytic cycle occurred.

Transmission of *P. cynomelgi* was successfully carried out by a number of anophelines, the complete development having been demonstrated in *A. sulciatus*, *A. annularis*, *A. culicifacies*, *A. barbitarsis* and *A. ivanovi*. *A. annularis* was chiefly used owing to its prevalence. Experience showed that sporozoites were most infective when development in the mosquito had occurred at 72°-82°F. In monkeys the incubation period after sporozoite infection averages 15 days. In two cases after 5 and 7 weeks infection had apparently failed. Accordingly splenectomy was carried out and in both cases, 12 and 52 days later, attacks occurred. Observations on 90 monkeys recovered from the primary infection showed that in 15 months only two experienced true relapses.

In transmission experiments 15 cc blood were taken from the heart 5, 10, 25, 37 and 72 minutes after sporozoite inoculation and injected intraperitoneally to other monkeys. Blood taken daily was similarly inoculated. In no case did infection occur earlier than 2 or 3 days before parasites could be detected in thick films of the blood of the sporozoite-injected monkeys. During the incubation period after sporozoite inoculation splenectomy was performed and the entire organ or a part of it was transplanted into test monkeys or an emulsion of the spleen was inoculated intraperitoneally. In no case did the test monkeys become infected. Similar experiments with like results were carried out with

becomes infective

Observations were also carried out on the skin of monkeys into which ground up thoraces of infected mosquitoes had been injected. The skin was removed after the expiry of varying intervals—a quarter of an hour up to four days. In only one or two sections of skin removed after an hour, were a few sporozoites seen though calculation showed that at least 1,000 sporozoites might be expected in one high power field. It is noted that only 39 per cent of the inoculated animals developed infection. Similar observations were made on spleens which had been implanted on the abdominal wall and into which sporozoites had been injected. Tissue removed at intervals failed to show developmental forms of the inoculated sporozoites. In this case only 50 per cent of animals injected with sporozoites became infected. It is stated

that tissues from 136 monkeys in various stages of infection have been preserved for later examination. It is noted that formol and malarial pigments can be removed from tissues by a saturated solution of picric acid in alcohol. In one monkey, in which arterial, venous and capillary blood showed only 13 per cent. of the red cells infected, the blood in the Billroth cords in the spleen had virtually 100 per cent. of the red cells infected. A similar phenomenon was recorded by TALIAFERRO and CANNON in 1936 in a monkey infected with *P. brasilianum* [this *Bulletin*, 1937, v. 34, 622].

Attention is drawn to various structures which might lead to fallacious conclusions. Such are adventitial histiocytes which lie in the smallest vacuoles of

macrophages resulting from the phagocytosis of various objects. Cyst-like bodies 40 μ in diameter and containing a large number of small structures were found in sections of the psoas muscle of one monkey with a heavy malarial infection. Their nature is unknown. Tissue cultures made from monkeys after sporozoite inoculations failed to reveal any developmental forms.

Tissues of Malabar squirrels infected with *P. ratuſae* failed to show any exoerythrocytic stages.

C. M. Wenyon.

PEEL, E. & RODHAIN, J. Contribution à l'étude des Plasmodiums des anthropoïdes africains dans le sang périphérique. Schizogony of *Plasmodium* Soc. Belge de Méd. Trop. 1945, Dec. 31, v. 26, No. 4, 341-7, 1 pl. [10 refs.]

A chimpanzee at Léopoldville infection of *Plasmodium reichenowi* (of man). The blood was examined the disease. In addition to the ordinary rings and "tenue" forms, mature schizonts were found in the blood every day, though in small numbers. The merozoites numbered 12-14. Schizonts were numerous in the spleen, rare in the liver, and absent from all other organs. No gametocytes were found either before or after death.

The authors suggest that the abnormal prevalence of schizonts in the peripheral blood, and the fatal nature of the infection, were due to a loss of premunition.

P. C. C. Garnham.

STAUBER, L. A. & WALKER, H. A. Preparation and Properties of Erythrocyte-free Avian Plasmodia. *Proc. Soc. Exper. Biol. & Med.* 1946, Nov., v. 63, No. 2, 223-7, 4 figs. on 1 pl. [11 refs.]

The authors have found, as others have done, that immune sera prepared in rabbits by the injection of haemolysed erythrocytes infected with avian plasmodia lose the agglutinative and precipitative antibodies when absorbed with normal uninfected erythrocytes. This has been explained by supposing that the avian plasmodia contain substances which are antigenically similar to erythrocyte antigens, so that haemolysis of the infected cells does not remove their share in the production of the immune response. Therefore, to investigate the possibility of producing suspensions of plasmodia freed entirely of the erythrocytes. After some experimentation it was found that if the suspension of infected erythrocytes, after sapoon haemolysis, was subjected to enzymatic digestion at low pH (5-5.5) practically all trace of the erythrocytes, including their nuclei, was

dissolved so that the washed product consisted almost entirely of spherical parasites 1μ - untouched by that in dry from *P. cathemerium*. Inoculation to young ducks shows however that the parasites though retaining their morphological character are killed. For preserving the parasites as antigen they are suspended in buffered saline containing 0.2 per cent formalin and stored in the refrigerator.

C. M. Wenzon

BELTRAN E. DAVALOS A. & SANDOVAL C. A. Estudio de infecciones artificiales con *Plasmodium malariae* en el hombre y con *P. gallinaceum* en el pollo en sus relaciones con los factores climáticos. [Study of Artificial Infections with *Plasmodium malariae* in Man and *P. gallinaceum* in Chicks in relation to Climatic Factors.] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico 1946 Dec. v. 7 No. 4 227-36 2 graphs. Summary in English by the author.

Data are presented in regard to the observation over six consecutive years of 155 artificially induced human infections with *P. malariae* and 152 artificially induced avian infections with *P. gallinaceum*.

In the case of human *malariae* the results obtained although not conclusive seem to indicate a greater severity on the infections produced in the cold and dry months (October to March) than in the warm and rainy months (April to September).

In the case of avian *malaria* the results are of more difficult interpretation. They seem to indicate that the principal factor involved in the type or character of the infection under the particular circumstances of our experiments was the age of the experimental animals.

To appreciate fully the results of our observations it is important to keep in mind that the seasons at Mexico City are not as clearly separated by sudden variations as is the case in other places of extreme climates. Therefore it seems desirable to repeat in other localities these observations.

MEYER Herta. Cultivation of the Erythrocytic Form of *Plasmodium gallinaceum* in Tissue Cultures of Embryonic Chicken Brain. [Correspondence.] *Nature* 1947 Aug. 2 155-6.

The author in cultivating the exoerythrocytic form of *P. gallinaceum* in tissue cultures of embryonic chicken brain found that proliferation of the parasites was very slow and the initial stages difficult to observe.

Embryonic chicken brain was therefore cultivated with a drop of highly infected chicken blood first in Carrel flasks passing later to the hanging drop method. In this way it was possible to note parasitized cells after 3 or 4 weeks of cultivation. The parasites seen had the same form as those in cultures of the exoerythrocytic form.

Details and illustrations of these findings are to be published fully.

H. J. O. D. Burke-Gaffney

TULLIS J. L. The Distribution of Exoerythrocytic Parasites and the Tissue Reaction caused by Blood-Induced *Plasmodium gallinaceum* Infection in Chicks. *Amer. J. Trop. Med.* 1947 Jan. v. 27 No. 1 21-9 9 figs on 2 pls.

pulp of the spleen. On the sixth day, such forms were found also in the liver, heart, lungs and intestine.

Suppressive quinine delays the appearance of *exo-erythrocytic* forms until the twelfth day; then for a fortnight they are plentiful in the above organs and are occasionally seen in the pancreas, fat, kidneys, bone marrow and striated muscle. Under suppressive therapy, the cytoplasm of the liver cells is solid and granular, whereas in (a) untreated cases, (b) uninfected birds, and (c) quinine-treated chicks in the pre-patent phase, it is clear and contains glycogen.

The histological methods include Maximow staining of sections preceded by intra-vital India ink.

P. C. C. Garnham.

TERZIAN, L. A. The Effect of Splenectomy on Avian Malarial Infections. *J. Infect. Dis.* 1946, Nov-Dec., v 79, No. 3, 215-20.

The lymphoid-macrophage system is known to be extremely active during the course of acute malaria in warm-blooded animals, but the exact relationship between the degree of splenomegaly and parasite density is unknown. The effect of splenectomy in two series of chicks infected with (1) *P. gallinaceum* and (2) *P. lophurae* was therefore determined. Very careful controls of several kinds (including the performance of laparotomy without removing the spleen) were maintained, and it was proved conclusively that splenectomy had no effect on the course of *P. lophurae* infections. With the more virulent *P. gallinaceum*, however, splenectomy during the latent period resulted in increased parasitaemia, indicating that the remaining lymphoid-macrophage cells in the body were not quite sufficient to deal immediately with this species of parasite.

P. C. C. Garnham.

BISHOP, ANN & BIRKETT, Betty. Acquired Resistance to Paludrine in *Plasmodium gallinaceum*. *Nature*. 1947, June 28, 884-5. [10 refs.]

The phenomenon of acquired drug resistance in plasmodia has previously been reported in a few instances [this *Bulletin*, 1921, v. 18, 96; 1933, v. 30, 860; 1935, v. 32, 116; 1942, v. 39, 438]. By treating chickens infected with a normal strain of *P. gallinaceum*, passaged intravenously every few days with 0.025 mgm. paludrine per gm. body weight, a resistant strain was developed.

after c
affecti
to the drug was developed by the parasites, which were normal in appearance and produced a heavy infection in chickens receiving the maximum tolerated dose of paludrine (2 mgm. per 20 gm. daily). The development of a normal strain of parasites was completely inhibited by such dosage. The new strain was also resistant to the methyl derivative of paludrine (M 4430) but not to mepacrine. Similar treatment to the above failed to produce resistance to the latter drug, but a minimal degree of resistance was obtained with plasmoquine (pamaquin) after 8 months' treatment. *Exoerythrocytic* forms appeared normally in infections with the resistant strain. In contrast to the result obtained by FAIRLEY [this *Bulletin*, 1946, v. 43, 527] in the case of human malaria parasites, development of the resistant strain occurred normally in mosquitoes (*Aedes aegypti*) which were fed on chicks receiving treatment with paludrine, and the sporozoites were infective. The stability of the resistance was unimpaired after 5 passages in mosquitoes over a period of 3 months. The mechanism of production of resistance is still a matter for speculation.

J. D. Fulton.

WILLIAMSON J BERTRAM D S & LOURIE E M Effects of Paludrine and other Antimalarials *Nature* 1947 June 28 885-6

Acquired resistance has been produced to paludrine in *P. gallinaceum* passaged in chickens in two series of experiments in which the host was treated with the minimum effective dose for normal parasites and with the maximum tolerated dose for chickens respectively. Resistance to the drug was first noted after 2 to 3 months in both series and when fully developed the resistant strain withstood 20 to 40 times the amount tolerated by the normal strain. The new strain maintained its characters after passage through the mosquito.

substances could not be prepared

J. L. F. R. M. M.

COLLSTON F & HUFF C G The Morphology of Cryptozoites and Metacryptozoites of *Plasmodium relictum* and the relationship of these Stages to Parasitemia in Canaries and Pigeons *J Infect Dis* 1947 Mar Apr v 60 No 2 209-17 13 coloured figs on 1 pl

The morphology of the wing skin of *P. gallinaceum*

void instead of crescent shaped cryptozoic merozoites and in that the merozoites were fewer in number. Differentiation into macro- and micro-schizonts in the metacryptozoic generations was noted.

The infection in canaries and pigeons behaved quite differently. In the former there was a patent parasitaemia in the latter the blood infection was occult or absent. Visible parasitaemia however occurred in pigeons following blood inoculation.

P. C. C. Garnham

HAWKING F Growth of Protozoa in Tissue Culture. II *Plasmodium relictum* Exoerythrocytic Forms *Trans Roy Soc Trop Med & Hyg* 1946 Oct v 40 No 2 183-8 17 figs (6 (4 coloured) on 2 pls) [11 refs]

Exoerythrocytic forms of *P. relictum* were grown in tissue culture by means of the author's *P. gallinaceum* technique. Growth of the spleen cells of the infected canaries was not quite as satisfactory as that of ordinary chicken tissue but the different stages could be followed. The parasites were unevenly distributed in the culture. Two types of schizonts may be distinguished one with a fair amount of cytoplasm distributed evenly throughout the parasite and the other with scanty cytoplasm concentrated around the chromatin. The free merozoites are elongate with one end pointed and the other blunt and with a central sphere of chromatin. No differentiation into macro- and micro-merozoites was noticed.

P. C. C. Garnham

GINGRICH W D & SCHOCH Eugenia W Standardization of a Test for Antimalarial Effect with *Plasmodium cathemerium* in the Canary *J National Malaria Soc* 1947 Mar v 6 No 1 68-73 3 figs

The authors describe the standardization of an antimalarial test in canaries infected with *P. cathemerium*, one advantage of these birds being that only small amounts of drug are required for this purpose. The strain of plasmodium

used produced only mild infections and exoerythrocytic forms of the parasite were not observed. The results therefore apply only to blood forms. In one experiment, the course of blood infection was followed in stained smears after intravenous inoculation of the host with from 5 to 0.1×10^6 parasites in 5 per cent. normal canary serum in saline. In addition, 5 birds were inoculated with 0.5×10^6 parasites and received oral treatment with quinine dihydrochloride in doses of 0.147 mgm. twice daily for $4\frac{1}{2}$ days, starting on the day of inoculation. Untreated birds which received the inoculum of $\frac{1}{2}$ million parasites had a peak of parasitaemia on the fifth day, and it proved the most suitable for the test. From the data obtained the "quinine equivalent" was calculated. It is the ratio of the amount of drug to that of the minimum effective dose of quinine, namely that which will produce a reduction in the number of parasites equal to that of the latter, over the period of test. Details of calculation of the quinine equivalent based on experimental data are given for two salts of pamaquin (plasmoquine).

J. D. Fulton.

TRYPANOSOMIASIS.

- i. NIGERIA. Annual Report Sleeping Sickness Service 1944 [McLETCHE, J. L.].
3 mimeographed pp.
- ii. —. Annual Report Sleeping Sickness Service 1945 [McLETCHE, J. L.].
12 mimeographed pp.
- iii. —. Annual Report Sleeping Sickness Service 1946 [McLETCHE, J. L.].
12 mimeographed pp.

i. Towards the end of 1944 Dr. H. M. O. LESTER ceased to be in charge of the Sleeping Sickness Service, having held this post since 1929.

During the year, staff remained on a maintenance basis, the usual distribution being 2 medical officers on sleeping sickness surveys, 2 controlling the infection among mine workers, 4 on the settlement scheme, well sinking, and tsetse control, 1 or 2 on leave, and 1 entomologist reopening his research programme. In addition there was a further assistant M.O. stationed at the Anchau Settlement.

of

a southern Zaria, where 88,000 people showed an infection rate of 2.2 per cent., as against 19 per cent. in 1936.

Six new dispensaries were built in Benue Province, and 1 in Zaria. The Service now controls 60 dispensaries, dressing stations and temporary field posts. The proportion of primary cases attending for full courses of 14 injections in dispensaries of the Benue Province is only 55 per cent., and in this province about 12 per cent. of dispensary cases relapse. The relapse rate among survey cases is much less, despite shorter treatment, because such cases are found at an earlier stage. In general, 20 per cent. of dispensary cases are relapses after previous, often inadequate, treatment.

The sleeping sickness dispensaries undertake a good deal of general work. Thus, in the 1944 epidemic of meningitis, 2,500 cases of this infection were treated by the Benue, and 1,850 by the Zaria, units. A considerable feature of the activities of sleeping sickness units is the treatment of yaws.

The protective clearance campaign affects 5 provinces. It is estimated that 49,000 people benefited by new clearings, totalling 180 miles in length, in districts of Zaria, Kano and Bauchi. In the old clearings annual growth is

light, and re-slashing is easily and efficiently done. About 400,000 people have now been protected by communal effort.

Education and propaganda are notable features, particularly in the Anchau tsetse-free corridor, and the care of new and improved villages is largely the result, to district, village and hamlet heads. There is encouragement of Geological

at a field of palpitis. ere results mentation he presented, on insect separation among mine labourers,

pt that more officers were away on leave

The Obudu division of Ogoja was surveyed for the first time revealing a lower sleeping sickness rate than had been expected—1.2 per cent among 49,610. A further puncture was performed in all the cases diagnosed, and of the 24 of the 36 with 30 mgm. fliers from ces, where of patients had the nervous system affected.

in connexion with the new Calabar-Mamfe road. ad among

As for re-surveys, in parts of the Northern Nigeria, Zaria and Kano, 85,000 persons were examined, revealing infection-rates of 0.3 to 1.3 per cent, as compared with 7 to 35 per cent at the original surveys (1933-43). In one particular district in the Katsina area in which district the original survey was followed by neither dispensary facilities nor communal clearance, an incidence of over 4 per cent was found, and this is regarded as a potentially dangerous focus. Figures for individual Katsina hamlets ranged from 2 to 20 per cent.

Regular 6-weekly examinations are a feature of the control measures in connexion with a mines labour force of over 5,000, in the "restricted" areas of Kabba-Ilorin, Niger, and south western Plateau Provinces. Every six weeks an average incidence of 0.67 per cent new cases is detected. The rate among these workers in 1940 was 6 per cent.

The standard treatments now used are —

(1) Trial dose of 0.2 gm followed by three 1.0 gm doses of antrypol, then five to ten 2.0 gm doses of triparasumide at 3-day intervals.

(2) Antrypol triparasumide mixture (antrypol 0.5 gm plus triparasumide 1.5 gm), 6 to 15 injections at 5- or 7-day intervals following on an initial trial dose of 0.2 gm antrypol. This "synergic" mixture is valued in advanced or

Progress in protective clearance, for each of 5 provinces. There is no doubt as to the value of these surveys.

(800-1,000 yards) ruthless clearings, made at points of possible high man-fly contact, along streams in the relatively arid Northern Provinces which have only a narrow fringe of thicket. Annual clearing of the regrowth represents only from a few hours' to 1 or 2 days' work per adult male. In the account of measures taken in Kano Province there is the interesting observation that groves of mangoes had been planted along relatively tsetse-free stretches of large rivers at Kauran Mata, near Kano. Fast [!] donkeys carried the fruit to Kano City. In due course epidemic trypanosomiasis decimated the donkey herds, and the groves were found to be "alive with *G. tachinoides*". Fortunately, no human epidemic arose, and the groves have now been cleared, with the exception of a stretch of 1,000 yards left for experimental purposes. Legislation is to be enacted to control the planting of low-branching shady trees along the banks of streams.

Progress in the Anchau tsetse-free corridor is described. Further long stretches of stream were cleared. Only one barrier clearance was found neglected. In all barriers there was heavy grass growth and no evidence of unusual erosion due to loss of riverine thicket. Schooling, propaganda, improvements in stock farming, encouragement of fruit and other useful tree planting, and well-sinking continue as prominent features of the settlement scheme. [Thus Anchau project is a striking example of bold, imaginative, and efficient planning and execution; it has not yet received the publicity and acclaim which it deserves. See this *Bulletin*, 1946, v. 43, 1022.]

Trials of *p*-arsenosphenylbutyric acid and pentamidine have continued. "They are valuable when a group of mild cases must be treated quickly and have the advantage over antrypol in that the initial injection, even of a full within a, usually ypol and

tryparsamide are still advised.

Observations by one officer on the erythrocyte sedimentation rate have shown a characteristic and very rapid increase in sedimentation, apparently related to the well-known occurrence in sleeping sickness of auto-agglutination. A low rate probably indicates a recent infection of low virulence, and a pronounced fall in the rate after the administration of antrypol appears to be diagnostic.

iii. The staff position was even worse than in the two preceding years. Nevertheless, more than half-a-million people were examined, which is more than in any previous year of mass examination, but the number who needed treatment was much smaller in 1946 than in the previous peak year. The actual figures for the numbers of persons examined in 1943, 1944, 1945 and 1946 are 197,307; 182,914; 281,493 and 508,745 respectively. In the table below the numbers of cases treated, in each of these four years, are grouped according to the organizational circumstances under which they received treatment —

	1943	1944	1945	1946
New surveys	5,321	Nil	624	Nil
Re-surveys		2,342	1,174	3,503
Dispensaries	13,100	10,432	10,126	9,707
Mines labour	540	475	293	277
Hospitals, etc.	2 703	2,380	3,107	3,286

There were no surveys of new areas. The bulk of the resurvey work was carried out in Katsina, where 2,291 cases were found in 207,846 people examined

in five districts. The best results were in the Galadima (Walamfashi) district where 2.8 per cent of 70638 people proved to be infected. The rates in individual hamlets ranged from less than 2 per cent. to about 12 per cent. No clearings had been made in this district. In four other Katsina districts re-surveyed the original infection rates (1935-1937) compared with the present rates were as follows: Kogo 9 per cent, 0.1 per cent; Danja 7 per cent, 0.9 per cent; Musawa 1 per cent, 0.1 per cent; and Kankara 11 per cent, 0.9 per cent. Since the original surveys in these districts there had been no follow up dispensary treatment and in other endemic areas but clearance measures had been in operation.

In the more central endemic area, in Zaria Plateau, Niger and Bauchi Provinces, most routine re-surveys gave rates around 1 per cent. Similar rates occur in Benue Province. More highly infected foci are known to exist especially in Plateau and Bauchi.

The mums labour force controlled has fallen to about 4500 scattered in at least 95 camps in 4 "restricted" areas. Examinations averaged at about 8 per cent every 6 weeks or about 5 per cent per year. This is to be compared with incidences of less than 0.5 per cent to 2 per cent in surveys made at intervals of several years in the surrounding peasant populations. There is no evidence of spread from the mining camps to the surrounding population.

Trial of pentamidine as a prophylactic was continued on a relatively small scale. The dose of isethionate now given is 200 or 250 mgm. intramuscularly. No statistics are provided in connection with these trials. Large-scale trials planned for 1946 had to be abandoned for lack of staff and of compulsory powers. The use of pentamidine is however non normal procedure in a number of Wamba camps and it is given on engagement and then every 4 or 5 months. It obviously gives better results as a prophylactic than did antipol in 1935 in the same area but the infection rate is already so low from the regular six weekly examination system that some time will have to elapse before conclusive figures are obtained.

The extent of communal protective clearance activities is described province by province. An interesting point mentioned in connection with the trouble (Raphia rufifera) common in trees south of Zaria and infested with *G. palpalis*. It has been found that the laborious digging out of roots and stumps can be obviated by driving in a stake but complete rotting can be ensured only by driving the stake into the true heart of the stump. A simpler and even more efficient method is to make a hole with a crowbar in the heart of each palm sucker and to pour in a few ounces of cotton tar. Further progress in the Anchau tsetse free corridor included 27 miles of new clearance and the sinking of 15 more well shafts. Most of the other developments in the settlement were along the same lines as described in previous reports of recent years.

An appendix refers to drug trials. Investigation of *p*-arsenosphenylbutyric acid (also known as 70A and Butarsen) in this Bulletin 1945 v 42 13 354 970 v 43 1017 has been in progress since 1944. Early cases responded badly though they reacted favourably to Butarsen plus trypanamide. This combination does not however appear to have been as efficacious as the standard synergic antipol trypanamide course. Trials still somewhat inconclusive are also in progress with melarsen (this Bulletin 1941 v 33 634) melarsen oxide (this Bulletin 1946 v 43 207) mapharside and with pentamidine isethionate. When given in higher dosages the last named compound has produced surprisingly good results even in cases with some evidence of

meningo-encephalitis. Intensive courses of pentamidine plus tryparsamide are therefore being compared with similar courses of antrypol plus tryparsamide.

E. M. Lourie.

COOKSON, L. O. C. The Serum-Formalin Reaction in *Trypanosoma rhodesiense* Sleeping Sickness. *J. Trop. Med. & Hyg.* 1947, July, v. 50, No. 7, 134-40.

test is easy to perform and to read, and it is suitable for field conditions. Its use in trypanosomiasis has been discussed previously [this *Bulletin*, 1925, v. 22, 539; 1926, v. 23, 427 & 894; 1927, v. 24, 958; 1938, v. 35, 705]. The cardinal signs of early sleeping sickness—fever, headache, debility, anaemia, lymphadenitis, C.N.S. symptoms, oedema, increased pulse rate, conjunctival infection, diarrhoea and wasting—may, any or all of them, be attributable to a variety of causes. The only proof of trypanosomal infection is the recovery of the causative organisms, and this is not always easy or practicable in the field.

The method of performance of the serum-formalin test, and its interpretation in terms of opacity and of gelification are detailed. Its value in the detection of cases of sleeping sickness was studied in five groups of persons. Group A consisted of 75 recruits for the N. Rhodesian Regt. from the tsetse-free areas—Group B consisted of 15 similar; 6 of these gave weak positive reactions (possibly have an active infection (possibly a past infection may be the explanation). Group C was made up of 11 patients suffering from a variety of wasting illnesses, including open tuberculosis, but not trypanosomiasis; in all but two the serum-formalin test was positive. Group D, 18 proven cases of *T. rhodesiense* infection, in all but one very early case, gave a positive reaction. Group E consisted of 8 persons suspected to be suffering from trypanosomiasis either on clinical grounds or because the serum-formalin test was positive. In all but one of these, the diagnosis was confirmed.

A. R. D. Adams.

PÉLLESIER, Aimé. La tryparsamide dans la trypanosomiase nerveuse. Échecs et dangers de traitements insuffisants. Quelques réflexions sur arséno-résistance. [Tryparsamide in Second Stage Sleeping Sickness. The Disadvantages of Insufficient Treatment, and Observations on Arseno-Resistance.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 9/10, 396-404 & 1947, v. 40, Nos. 1/2, 23-49. [77 refs.]

This is an excellent, if somewhat discursive, treatise. It is well supported by references to, and extracts from, published work, and includes a very useful exposition, together with the author's own evaluation, of views reached by various workers, especially French and Belgian, on the treatment of gambiense sleeping sickness up to March 1945. Due consideration is also given to the lessons of strictly laboratory researches, such as those on arsenic-resistance by Warrington YORKE and his co-workers.

Difficulties of supply in French Equatorial Africa from June 1940 imposed the necessity of limiting treatment with arsenicals in a high proportion of patients to no more than six injections per case. Some four years after the beginning of this stringency in the course of re-surveys especially in the Mayama Brazzaville Sector the author was struck by the high proportion of cases of nervous involvement. The belief that these were due to inadequate treatment impelled him to study the history of the use of tryparsamide in general as well as in particular regard to the records of the Pasteur Institute at Brazzaville.

The earliest reports on the clinical use of tryparsamide gave particularly low success rates [criteria of success undefined] in cases of nervous involvement but as knowledge was acquired of the best way to use the drug these rates gradually improved as follows: 45 per cent VAN DEN BRANDEN and VAN HOOFF [this *Bulletin* 1924 v 21 346], 43 per cent LAIGRET [this *Bulletin* 1926 v 23 900], 62.5 per cent LEDENTU [this *Bulletin* 1928 v 25 337], 78.6 per cent SICE [1928 *Arch Inst Pasteur de Brazzaville*]. In first stage cases however the results deteriorated so that the earliest success-rates of 100 per cent gave way to 81.5 per cent by 1927. Several writers accordingly reached the conclusion that while tryparsamide is the drug of choice in cases of nervous involvement 270 Fourneau (Orsanine) is preferable in the lymphatico-blood stage.

By 1928 the Pasteur Institute Brazzaville had arrived at the basic principles which continued to prevail until the time of writing for the use of tryparsamide in second stage sleeping sickness. Weekly doses are slowly increased from about 20 mgm/kilo till the 3rd-injection when a dose of 40 mgm/kilo for adults (50 mgm/kilo for children) is reached. This is continued to a total of at least 400 mgm/kilo for an adult so that the course consists of about a dozen doses aggregating 22.25 gm. Higher individual doses such as 60 mgm/kilo for adults and 90 mgm/kilo for children tested by CHESTERMAN [this *Bulletin* 1932 v 29 638] do not improve the cure-rate whilst they considerably increase the incidence of ocular damage. It is thought that replacing the first few injections of tryparsamide by two or three injections of Orsanine or Moranyl gives greater security against persistence of lymphatico-blood infection.

Although results with tryparsamide at the Brazzaville Institute gradually improved from 1924 to 1930 they have since become less satisfactory. In 1929 and 1930 the success-rates in cases of nervous involvement were 62 per cent and 86 per cent respectively. In 1936-1937 they were about 49 per cent and for the next 6 years about 53 to 60 per cent. These are based on short periods of observation. Presumptive cures are after observation periods of

This is similar to the results obtained among such cases as were treated with only 6 doses of tryparsamide in 1924-25. The conclusion is therefore that a course of 6 doses has consistently been less effective than one of 12 doses. Of 18 fully treated patients lumbar punctured after both the 6th and the 12th dose 7 were found to present a deterioration in the c.s.f. picture half way through the tryparsamide course followed by a normal or subnormal picture at the end of treatment. [The reviewer (this *Bulletin* 1943 v 40 370) also showed an increase followed by a decrease to less than the original count in c.s.f. cells in a fair proportion of Sierra Leone cases punctured both 5-6½ weeks and 4-5 months after the start of treatment with tryparsamide. The tendency towards such a

"hump", at this early stage in the progress of the c.s.f. towards normality during successful treatment, may be misleading to those attempting to use early lumbar-puncture findings in order to assess the results of any particular treatment.] The author postulates that the meningeal reaction, apparently stimulated by the earlier part of the treatment-course, provides a favourable nidus for the further development of such trypanosomes as have thus far escaped the effects of treatment, and it is, therefore, especially necessary to complete the full course of 12 injections.

SALEUN (*Rapport Inst Pasteur Brazzaville, 1937*) distinguishes three phases of second stage sleeping sickness: (1) congestive when the parasites multiply in the meningeal vessels. This is the period characterized by increase of leucocytes and no, or in the c.s.f. It is particularly responsive to Or the meningo-encephalitic phase, with great increase both of leucocytes and of albumin, together with the appearance of trypanosomes in the c.s.f., and, finally (3) a phase of considerable parenchymatous damage to the central nervous system, trypanosomes are able to shelter from the effects of treatment in the lesions produced at this period, and are thence able to invade other areas after treatment has stopped.

The author reviews evidence for "trypanotoxins", and then discusses the mode of action of tryparsamide. This is subject to four main complicating factors, each of which is considered at great length. They are as follows:—

(1) *The neurotoxic action of tryparsamide.*—Optic nerve damage and arsenical polyneuritis are discussed in detail. An arsenical "meningitis" sometimes occurs, causing an increase in cells and albumin, particularly the latter. This has led some authorities to defer post-treatment lumbar puncture until 1-3 months after the injection-course. The author condemns this as a dangerous practice. He advises lumbar puncture 7 days after the end of treatment, if the c.s.f. is normal the patient then reports every three months, otherwise he should be punctured again the following month. If on this occasion the fluid is normal, the previous result may be ascribed to a toxic meningeal reaction, and the patient is then placed on three-monthly observation; if the fluid has hardly changed, the infection is regarded as not yet eradicated, and another course is administered; and if the fluid has deteriorated then a relapse is registered, and this also, of course, necessitates further treatment.

Reference is made to "*l'hyperalbuminose cicatricielle*" (BRODEN and RODHAIN's phrase), an obstinate albumin-level at about 30 mgm. per cent., occasionally persisting for years in cured cases.

(2) *The action of "trypanotoxins".*—The most notable effect under this heading is the Jarisch-Herxheimer reaction. The deterioration in the c.s.f. picture, mentioned above as sometimes occurring half-way through a full course under this heading, instead of being Reasons for this conclusion are that continued to the end of the course, and it involves mainly an increased cell-count, whereas an arsenical "meningitis" is shown mainly by increased albumin.

(3) *Arseno-resistance of the trypanosome.*—An outline is given of the researches of Warrington YORKE and his co-workers, and the confirmatory work of others, on acquired resistance in trypanosomes. The author has little doubt, in view especially of reports from the Belgian Congo, that arsono-resistant strains of *T. gambiense* have arisen consequent upon previous treatment with arsenicals.

(4) *Arseno-resistance of the patient.*—Failure to respond to treatment may be due, not to arsono-resistance on the part of the trypanosome, but to inability

of the patient to utilize the arsenical adequately. In the course of a very long
 treated. He quotes
 response to treatment

increases in the incidence of arseno-resistance

FOWLER, A. F. Intensive Tryparsamide Therapy in the Treatment of
 Trypanosomiasis. *Trans. Roy Soc Trop Med & Hyg* 1947, July, v. 40,
 No. 6, 763-70

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In 12 patients treated by the second method, all of whom showed central

VAN HOOFF, L., HENRARD, C. & PEEL, E. Chimio-prophylaxie de la maladie du sommeil par la pentamidine. [Chemoprophylaxis of Sleeping Sickness by Pentamidine.] *Ann. Soc. Belge de Méd. Trop.* 1946, Dec. 31, v. 26, No. 4, 371-84.

These results led them to successful trials of prophylaxis by pentamidine as a large-scale means of trypanosomiasis control in the field [this *Bulletin*, 1944, v. 41, 928; 1946, v. 43, 536].

It was pointed out by FULTON [this *Bulletin*, 1944, v. 41, 929] that the protective effect obtained in the above experiments in guineapigs might, in large measure, be attributable to an immunizing effect consequent on the repeated test-inoculations, quite apart from any prophylaxis conferred by the pentamidine itself. Similar considerations had been advanced by DUKE [this *Bulletin*, 1936, v. 33, 637] in connexion with the protection observed in volunteers treated prophylactically with Bayer 205, and the authors themselves had then examined the matter in guineapigs, but without being able to bring particularly strong support to Duke's conclusions [this *Bulletin*, 1940, v. 37, 703].

In view of the fact that the authors' recent work was done with different strains of trypanosome and different host species from those of other investigators, they decided to re-examine the question under circumstances which would eliminate the factor of immunization.

Experiments in guineapigs.—Each animal was subjected to only one, and not to repeated, attempts at inducing infection. The experiments led to the conclusion that complete protection against being infected with *T. gambiense* by

protection appears to be slightly shorter—53 days after 3 injections of 2 mgm./kgm. pentamidine—when tested by inoculation of trypanosomes instead of by bite of infected tsetse flies.

Protection could not be augmented by repeated injections of rich and live cultures of *T. gambiense* at intervals after the prophylactic dose of pentamidine.

The protection periods, in the absence of any immunizing factor, were therefore appreciably longer than those obtained by FULTON with *T. rhodesiense* in mice, thus suggesting that parasite-species and host-species are important factors in this connexion.

Experiments in man.—Three human volunteers were given intramuscular injections of 4.8 mgm./kgm. of the di-isethionate. They were then bitten by infective tsetse flies after periods, respectively, of 48-53, 90-92, and 184-5 days. All three patients failed to become infected. The tsetse flies were proved to be infective by later applying them to guineapigs, and by dissection.

The authors therefore conclude, though themselves admitting the evidence to be scanty, that pentamidine can guarantee the African against natural infection for a period of 6 months [their own italics]. They point out that the protection afforded by pentamidine is not comparable with that afforded by the di-isethionate, which can guarantee such a period. The protection afforded by pentamidine is not comparable with that afforded by the di-isethionate, which can guarantee such a period. The protection afforded by pentamidine is not comparable with that afforded by the di-isethionate, which can guarantee such a period.

[November 1947]

Since 1943 large scale trials of prophylactic pentamidine mainly at a dose of 5 mgm/kgm have been in progress in the Belgian Congo and results will be published in due course E M Lourie

LEWIS E A & LANGRIDGE W P Developmental Forms of *Trypanosoma brucei* in the 'Saliva' of *Glossina pallidipes* and *Glossina austeni* Ann Trop Med & Parasit 1947 May, 41 No 1 6-13 1 pl & 30 figs [13 refs]

These observations of the developmental forms of *Trypanosoma brucei* in two species of tsetse flies—*Glossina pallidipes* and *G. austeni*—were made by examining under the microscope stained fixed smears of the fluid ejected from the proboscis of the fly on to warm glass slides the technique recently described by BURTT (this Bulletin 1946, 43 1121) being used. The laboratory bred flies were fed on an animal infected with a strain of *T. brucei* that was isolated from a camel in 1944 and afterwards maintained by direct and cyclical transmissions through a variety of vertebrates. About the 14th day after the first feed the flies were starved for 48 hours and the fluid from the proboscis on to the slides was repeated every 7 days. The authors deduced the fluid from the proboscis of the flies from the salivary glands in the flies from the salivary glands. This procedure

They observed trypanosomes of various shapes and sizes such as have been described in previous accounts of the development of the polymorphic trypanosomes in other species of tsetse flies references to which are given in the paper. The first form to appear in the slides was the typical proventricular trypanosome tadpole like trypanosomes (called by the authors post proventricular forms) crithidia and metacyclic trypanosomes appeared later but as development proceeded the flagellates in the smears became very numerous making observation more difficult.

The course of development from the proventricular trypanosome to the final metacyclic trypanosome is thought by the authors to be as follows: the cytoplasm of the typical proventricular trypanosome flows into its posterior part producing a somewhat tadpole like appearance the anterior part becoming attenuated this is called a post proventricular trypanosome. The nucleus becomes elongated passes into the posterior swollen part and divides into two this division being preceded by division of the kinetoplast. Each daughter kinetoplast lies close to and in front of a corresponding daughter nucleus and the cytoplasm splits to form two crithidia—a short aflagellate one cut off as a section of the swollen posterior end and a long flagellated one. The latter probably degenerates while the former develops a flagellum migrates to the salivary gland and becomes attached there by its flagellar end. It divides nearly equally by fission and the posterior half develops a flagellum and separates off as a free crithidia which becomes a metacyclic trypanosome this is broad at first but becomes thinner later. The authors give dimensions of these various forms.

Coiled up and round forms appeared several days later than the metacyclic trypanosomes as they were rarely seen before the flies showed signs of debility. The authors regard them as arising only in adverse circumstances and not as part of normal development. Short crithidia were regularly present in smears from all flies which became infective and were rare or absent in smears from flies which failed to transmit the infection.

The authors' strain of *T. brucei* developed more readily and produced daughter crithidia more frequently in *G. pallidipes* than in *G. austeni* under similar conditions. [Must there not be some doubt about the places of origin of some of the crithidia and trypanosomes seen in the smears?] *J. F. Corson.*

VAISMAN, A. L'atténuation de l'infection trypanosomiale expérimentale chez la souris, par le *Spirocheta duttoni* somiasis in Mice by *Spirochaeta*
v. 40, Nos. 3/4, 74-6.

The author studied the effect on mice experimentally infected with *Trypanosoma equiperdum* and *T. brucei* of injecting quantities of *Trep. duttoni*. In common with previous workers they had already noted that the presence of *Trep. duttoni* in the blood of such mice had delayed the appearance of trypanosomes.

All infections were produced by intraperitoneal injection. The experiments consisted of injecting the spirochaetes (1) simultaneously with the trypanosomes, (2) 2 to 8 days before the trypanosomes, (3) 24 hours after. In (1) both parasites appeared in the blood on the second day; the trypanosomes, instead of killing the mice within the week, disappeared from the circulation in 4 to 5 days; the spirochaetal infection pursued its usual course. After a variable period of 15 to 40 days, the trypanosomes reappeared and usually killed the mice in a few days. In two cases, however, complete recovery occurred.

In (2) the infection was the same as (1).
In (3) the infection was the same as (1).

Exceeding the time limits of 8 days in (2) and 24 hours in (3) interfered with the phenomenon, producing either a slightly delayed action or increased virulence respectively.

The effect of the spirochaetal infection on the trypanosomiasis occurred only in the acute stage of the former.

Further experiments, which are described, suggested that this attenuating effect could not be accounted for either by a direct action of *Trep. duttoni* on the trypanosomes or by the development of trypanocidal antibodies in the surviving mice.

The trypanosomes which reappeared in the relapses did not develop any resistance to further spirochaetal infection.

H. J. O'D. Burke-Gaffney.

LEISHMANIASIS.

i. DE AZEVEDO, J. F. Novos dados sobre a biologia das espécies de *Phlebotomus* de Lisboa e arredores. [New Biological Data concerning the *Phlebotomus* Species in Lisbon.] *An. Inst. Med. Trop.* Lisbon. 1946, Dec., v. 3, 7-20, 3 figs. (2 on 1 pl.). English summary.

ii. — & TEIXEIRA, A. W. G. Sobre as preferências hemáticas das espécies portuguesas de *Phlebotomus*. [Blood Preferences of Portuguese Species of *Phlebotomus*.] *Ibid.* 159-81. English summary.

iii. —. Uma anomalia rara verificada numa fêmea de *Phlebotomus perniciosus*. [A Rare Anomaly in Female *Phlebotomus perniciosus*.] *Ibid.* 183-6, 3 figs (2 on pl.). English summary.

i. In the first paper the author gives the results of a *Phlebotomus* survey and around Lisbon. The following species were captured, but only

May and November. *P. perniciosus* (most common) *minutus* *sergenti* and *arias*. The resting places in order of preference were cattle sheds pig styes human dwellings stables fowl pens dog kennels and rabbit hutches. The blood preferences were chiefly bovine and then dog fowl horse man and pig. Among 2 614 *Phlebotomus* dissected only one specimen (*P. perniciosus*) was found infected by a form of *Leptomonas* of which photographs are given for comparison with photographs of *Leptomonas* forms from a culture of *Leishmania donovani*.

ii The authors of the second paper describe the technique of the precipitin tests performed on the blood contained in the alimentary tracts of the 2 614 *Phlebotomus*. They analyse in greater detail the

cent with a ...
iii In the third paper the author describes a ... and drawings a specimen of *P. perniciosus* with three spermathecae. It was found among 5 736 females caught during the above survey. H. S. Leeson

DOLNATOVA A. V. [On the Biology of Sandflies Inhabiting Burrows] *Med. Parasit. & Parasitic Dis.* Moscow 1946 [1947] v. 15 No. 6 47-53 3 figs. [In Russian.]

In view of the epidemiological importance of sandflies inhabiting burrows of wild animals which serve as reservoir hosts of human leishmaniasis the author ... a study of the biology of these insects at Shulaverry in the Georgian ... carried out during the summer of

... were occupied by ... and in gauze traps ... comprise the following eight species: *Phlebotomus papatasi*, *P. sergenti*, *P. perniciosus* var. *tobbi*, *P. chinensis*, *P. kandelaki*, *P. persilicis* var. *transcaucasicus*, *P. sergenti* var. *mongolensis*, *P. minutus* var. *arpaklensis*. All of these forms were recovered from burrows but only five (*P. papatasi*, *P. perniciosus* var. *tobbi*, *P. sergenti*, *P. chinensis* and *P. kandelaki*) were found in houses.

The flight of sandflies into and out of the burrows always took place during the evening hours, the ... emergence probably being the onset of twilight rather than of sandflies flying out.

new horn females and those which had laid eggs ... The number of sandflies leaving inhabited burrows was 5-6 times greater than that emerging from uninhabited ones. In the former case the sandflies contained ... of question except the 2nd and 3rd stages. In the latter case ... which included females ... burrows serve as breeding

is of no importance ... seen to attack man in the open. On the other hand *P. perniciosus* is abundant in burrows, constitutes 22.7 per cent. of the species found in houses and attacks human beings in the open. Since it can be infected with *L. donovani* under experimental conditions it is conceivable that this species might serve as a natural vector of the infection. As regards *P. sergenti*, although it readily

attacks man, its numbers both in the burrows and in houses are too small for it to be of much importance in the transmission of leishmaniasis.

C. A. Hoare.

ADLER, S. The Behaviour of a Sudan Strain of *Leishmania donovani* in *Phlebotomus papatasi*. A Comparison of Strains of *Leishmania*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, May, v. 40, No. 5, 701-12, 2 figs. on 1 pl. [15 refs.]

The behaviour in *P. papatasi* of a Sudan strain of *Leishmania donovani* was studied. Flies became infected after feeds on (a) cultures; (b) infected spleens; and (c) hamsters suffering from the disease. In the case of (a), the infection tended to die out in a few days. None of these flies was able to transmit leishmaniasis by bite, but inoculation of the contents of the mid-guts was followed by infection. Only 2 out of 51 of the sandflies feeding on infected hamsters became infected, and then only in the stomach; this phenomenon provides one method of distinguishing strains, different strains giving significantly different infection rates in various species of *Phlebotomus*. It is assumed that when infection is low, there is an active natural immunity in the fly against a certain species, though the immunity may be broken down by employing massive doses of parasites.

The author then proceeds to show how the various species may be differentiated:—

L. tropica.—In Syrian hamsters, visceral and skin infections are produced, the parasites measuring as much as $5.6\mu \times 3\mu$. Culture on Locke-serum-agar produces thick granular masses of flagellates. High infection rate in *P. papatasi*.

L. infantum.—In Syrian hamsters, visceral and skin infections are also produced, but the parasites seldom measure more than $4.2\mu \times 2.8\mu$. Culture produces uniform character of growth. [The plate (Fig. 1) is misnamed "*donovani*"; Prof. Adler has pointed out to the reviewer that it should read "*infantum*".] Low infection rate in *P. papatasi*, but parasites progress anteriorly.

L. donovani.—In Syrian hamsters, visceral and skin infections (with small parasites). Growth of Indian strains in culture is rather thicker than in *infantum*. Low infection rate in *P. papatasi*, parasites mainly confined to stomach.

L. brasiliensis.—In Syrian hamsters, local infections only.

There are discrepancies in the behaviour of local strains which have led the author to suppose that mutation had occurred.

P. C. C. Garnham.

ADLER, S. Cellular Reactions in Leishmaniasis. *Acta Med. Orientalia*. 1947, May, v. 6, No. 5, 151-5, 4 figs.

The characteristic reaction in leishmaniasis of mammals is proliferation and parasitization of the cells of the reticulo-endothelial system. There is also a secondary reaction, a round-cell infiltration, and this is usually associated with a marked reduction in the number of leishmania in the tissues thus infiltrated. The author believes that this second reaction is a curative one. He points out that in the spermophil, in which experimental infection with *Leishmania donovani* is invariably fatal (the animal dying in two to four months), there is an intense proliferation of the reticulum cells with little evidence of round-cell infiltration. On the other hand, in the dog in which the infection is nearly always subacute and often symptomless, the proliferation of the reti is accompanied by round-cell and plasma-cell infiltration. The author points out that in experimental *Leishmania tropica* infection of m

early stages a syncytium of parasitized reticulum cells is formed with no round cells and that this is followed by an intense round-cell reaction with a continuous diminution of the leishmania

He concludes that lymphocytes appear to play some part in the defence mechanism against leishmania infection

L E Napier

DE AZEVEDO J F
leishmania dans
Azar by Examin
1947 Mar v 25 No 1 52-61 1 fig [10 refs]

For the definite diagnosis of kala azar it is necessary to demonstrate the causal parasite *Leishmania donovani*. Although there are many other diagnostic procedures none is entirely specific. The parasite has been found in the material drawn from the spleen the liver the lymphatic glands and the skin it has been found in the bone marrow blood faeces urine saliva and sputum and in scrapings from the nasal mucosa.

Spleen puncture is the most certain method usually giving 100 per cent positive results but it is not entirely without danger and requires a delicate

cent) and FRAGO DE AZEVEDO (the author) in Portugal (8.18 per cent). The author considers that in the Mediterranean zone this is a practical method of diagnosis

He scrapes the
It is not necessary
atium loop this is
As the parasites are
in the histiocytes in the submucosa it is necessary to break the surface a
superficial smear is useless. It is not necessary to use a local anaesthetic no
discomfort follows but occasionally there is a little epistaxis

He obtained positive results in 9 out of 11 cases by this method. In one of
er

The advantages of this method are its simplicity and safety it can be carried out in all cases even before the spleen is enlarged and it can be used to check progress under treatment

L E Napier

FALCÓN TREJO A. Algunas historias de kala azar infantil. [Some Cases of Infantile Kala Azar] *Med Colonial* Madrid. 1947 Apr 1 v 9 No 4 322-5

Infant kala azar is more common in Badajoz than is generally believed because cases are at times by no means typical. The author gives details of three such atypical cases. In two (sisters) there was fever but in the early stage in one no enlargement of spleen nor positive serological reactions but cervical adenitis with some degree of anaemia and relative lymphocytosis. In the

second, the symptoms were similar but, when the child was seen two months later, the serological reactions were positive. A third child had daily fever, sometimes with shivering, diarrhoea, and a spleen palpable on deep inspiration. Intestinal infection was considered, but the Nattan-Larrier reaction [this *Bulletin*, 1936, v. 33, 21] was positive and the conditions cleared up on administration of neostibosan. Two other cases are recorded in which kala azar was suspected because of fever, anaemia and relative lymphocytosis, but in one the cause was malaria and in the other *Salm. typhi*, serum reactions for kala azar being negative. No mention is made of puncture of spleen or sternum, except to say that in the country districts these are difficult, if not impossible, to carry out.

H. Harold Scott.

DEBONO, J. E. Kala-Azar in Infancy. *Proc. Roy. Soc. Med.* 1947, Feb., v. 40, No. 4, 155-59 (Sect. of Paediatrics 1-5), 1 fig.

The paper is a description of kala azar as seen in Malta. There is no essential difference between infantile and adult kala azar. The disease is, in any case, not confined to infants, but rather to young children. In 200 cases, the numbers in each of the first 8 years of life were 10, 76, 55, 26, 20, 8, 2 and 3, respectively: that is, 97.5 per cent. were under the age of 6. None was over 8 years.

The basic pathological lesion is an invasion by leishmania with resultant proliferation of the reticulo-endothelial tissues in all parts of the body, the spleen and liver being mostly affected. There is hypochromic anaemia (2.5 million red cells) and marked leucopenia (2,000 or less), with granulopenia

1. months, but may be much longer. The onset is usually insidious with irregular pyrexia, loss of appetite and energy, weight and colour; the fever subsides after 2 to 6 weeks; there is a remission of similar length; and this is followed by another febrile bout. The spleen enlarges progressively at the rate of about 2 fingers breadth per month. The fever continues and there may be alternating attacks of diarrhoea and bronchitis. However, the disease may take an acute course from the beginning, or hyperpyrexia, cyanosis and haemorrhages in the skin may develop and prove rapidly fatal.

Diagnosis in the early stages is difficult. The 4-hourly temperature chart usually shows a double or triple daily rise, and there is usually leucopenia: confirmation must be obtained by blood culture, since at this stage the spleen is too small to puncture. [Bone puncture is useful at this stage.] When the disease is well developed, diagnosis is easier, but many febrile conditions such as undulant fever must be excluded. Diagnosis is best confirmed by spleen puncture. The author has done 2,000 spleen punctures with only two deaths.

The disease responds well to treatment by intravenous antimony. Neosti-

Adjuvant treatment for obviating or eradicating secondary infections is important, and penicillin has been used for this purpose.

The author recorded 3 deaths and 7 relapses in a series of 200 cases. In reply to a question by Colonel Shortt, he said that he had never seen an instance of dermal leishmanoid.

Colonel Shortt discussed the transmission of kala-azar. He said that, as dogs were the reservoirs of infection in the Mediterranean area and were very heavily infected, there was probably a very heavy sandfly infection here. suggest

HO, E. A., HSU, T. H. & SOONG, T. H. Canine Visceral Leishmaniasis in Villages West of Lanchow, China. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, July, v. 40, No. 6, 889-94, 1 map. [13 refs.]

"Forty-four dogs naturally infected with visceral leishmaniasis were found among 1,430 examined in villages about 50 km. west of Lanchow. Epilation and seborrhea were present in all but one of the dogs. Leishmania were found by skin biopsy in thirty-eight of the forty-four dogs and by ilium puncture in thirty-nine of forty-one dogs in which this operation was performed. The altitude of the area under study ranges from 5,656 to 7,788 feet above sea level. On this high plateau kala-azar, as well as sandflies, was also found to be present."

DOSTROVSKY, A. & SAGHER, F. The Intracutaneous Test in Cutaneous Leishmaniasis. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 265-9, [12 refs.]

It is often difficult, and sometimes impossible, to demonstrate leishmania in the cutaneous leishmaniasis (oriental sore) lesion. This is particularly true of the recurrent and other chronic types of lesion. Therefore some more reliable diagnostic procedure should prove useful. The use of leishmania vaccine for this purpose was suggested by MONTENEGRO (1926) [this *Bulletin*, 1926, v. 23, 585], and in 1935, Dostrovsky [*ibid.*, 1936, v. 33, 21] demonstrated positive skin reactions by the intracutaneous injection of a vaccine containing 100,000 per 0.1 ml.

Both the intracutaneous test and the parasitic examination were carried out in 217 cases of leishmania nodosa in Jerusalem; the intracutaneous test was positive in 95.3 per cent. and parasites were demonstrated in 54.3 per cent. In 47 cases of recurrent leishmaniasis, the parasites were only demonstrated on 4 occasions, whereas the intradermal test was positive in all but one case. The chances of a non-specific reaction are low, in only 7 out of 94 control cases did a positive reaction occur, in five of these there was a possibility of a previous leishmaniasis lesion, and in two only was this possibility ruled out.

Two strains of vaccine were used, a Palestinian and a Baghdad strain, in 147 cases. No significant difference in the reaction was demonstrated.

To test the time of the first appearance of the reaction, 3 volunteers were inoculated with 2 million living leishmaniae; in two cases the reaction was positive on the second day after inoculation and in the third a slightly positive reaction was obtained on the 3rd and 13th days and a definitely positive reaction after 5 weeks. In one case of recurrent leishmaniasis the reaction was persistently negative until the lesion had healed under treatment with Grenz rays.

In 11 passive-transfer experiments, with serum from a patient with a recurrent leishmaniasis lesion, and from another with an old scar of 30 years' duration, four gave positive results. This suggests that antibodies develop which, after transfer to a non-immune subject, will give rise to a positive reaction. This appears to indicate that the reaction is an allergic one. L. E. Napier.

STEINHAEUER, L. Recurrent Verrucous Leishmaniasis of the Skin (Oriental Sore). *Acta Med. Orientalia.* 1947, Mar., v. 6, No. 3, 91-4, 2 figs.

A chronic dermal leishmaniasis lesion, which simulates lupus vulgaris and in which it is difficult to demonstrate leishmania except by cultural methods, is common in Palestine. It is usually described as "recurrent cutaneous leishmaniasis". The diagnosis is often difficult, but a tentative diagnosis

The toxic product formed was isolated by hydrolysis to the corresponding hydrocarbon m.p. 163° mentioned another empirically similar hydrocarbon having an m.p. of 149°.

The characters and chemical structure of the two hydrocarbons and the investigational approach undertaken are discussed in detail and should be read in the original.

H. J. O'D. Burke-Gaffney.

HENRY, A. J. Fluorescence "Fatigue". [Correspondence.] *Nature*. 1947, Aug. 2, 163.

The author deprecates the use of the term fluorescence "fatigue" stated by ALPER (*Nature*, 1946, Sep. 28, 1000) for vitamin A and riboflavin suggests an analogy with

He discusses his own recent work on the photochemical instability of stilbamidine (*J. Chem. Soc.*, 1946, Dec., 1156) and considers that the changes in fluorescence which occur in solutions of these compounds on irradiation can be explained completely in terms of the photochemical change which occurs: a similar explanation may be found in the case of riboflavin, and this can be readily demonstrated by the method described by himself with GRINDLEY [this *Bulletin*, 1945, v. 42, 783].

"It is scarcely conceivable that any process at all comparable with either type of fatigue can occur in the case of a fluorescent molecule, particularly in dilute solution."

H. J. O'D. Burke-Gaffney.

FEVERS OF THE TYPHUS GROUP.

DAVIS, W. A. Typhus at Belsen. I. Control of the Typhus Epidemic. *Amer. J. Hyg.* 1947, July, v. 46, No. 1, 66-83, 1 fig.

The author's earlier report on typhus at Belsen had a restricted circulation and so was not generally available; it was reviewed in this *Bulletin*, 1946, v. 43, 427, and as the present report covers the same ground no further abstract is called for.

John W. D. Megaw.

SNYDER, J. C. Typhus Fever in the Second World War. Reprinted from *California Med* 1947, Jan., v. 66, No. 1, 30 pp. [69 refs.]

CHATTERJEE, P. K. & BANERJEE, A. Typhus Fever in Calcutta. *J. Indian Med. Ass.* 1947, Feb., v. 16, No. 5, 157-8

Account of a case of scrub typhus in a patient who had not left Calcutta for a month previously

PHILIP, C. B. Observations on Tsutsugamushi Disease (Mite-borne or Scrub Typhus) in Northwest Honshu Island, Japan, in the Fall of 1945. I. Epidemiological and Ecological Data. *Amer. J. Hyg.* 1947, July, v. 46, No. 1, 45-59, 8 figs. [24 refs.]

The author states that in 1893 Kitasato gave serious credence to the early beliefs of Japanese farmers that "flood fever" was caused by the bites of mites which were known locally as aka-mushi (red mites) and tsutsuga (dangerous mites); he mentions that in the same year SMITH and K. made the historic discovery of the transmission of cattle fever by

The paper contains interesting observations made by the author during a visit in October 1945 to two of the three known areas of endemicity of tsutsugamushi disease in Honshu Island. The incidence of the disease has greatly diminished during the past 10 years from about 200 to 250 cases yearly to 43 in 1943 and 38 in 1944. The case fatality rate remains high (36 deaths among 81 cases in 1943-44) and no evidence could be found of the occurrence of mild undetected attacks.

Complement fixation tests were carried out on sera of four persons convalescent from attacks in 1944 and of three persons attacked in 1945. Using the Harp (New Guinea) antigen the titres observed in the former group were 1-64 0 1 8 and 1-4 with the Gilliam (Burma) antigen the titres were 1-512 1-32 1-32 and 1-4 respectively.

With the same strains of antigen in testing persons attacked in 1945 the results were with Harp antigen 1-32 1-512 and 1-512 with Gilliam antigen all three were negative.

These findings show the need for caution in interpreting the results of the complement fixation tests.

In Nagata the more heavily infected of the two areas five species of larval mites were found on the field vole (*Microtus montebellus*) they were *Trombicula akamushi* *T. pallida* *T. palpalis* *T. japonica* and a new species of *Gahrlepis* was

PHILIP C. B. Observations on Tsutsugamushi Disease (Mite-borne or Scrub Typhus) in Northwest Honshu Island Japan in the Fall of 1945. II. Systematic Comment on the Japanese Vole-Mites. *Amer J Hyg* 1947 July v 46 No 1 60-65 [21 refs.]

The author without claiming finality offers comments on the very confusing subject of the nomenclature of the various mites described by Japanese workers as occurring on field voles. He gives a key to the identification of the known species.

The paper is highly technical and must be read in the original form by entomologists interested in the Trombiculidae. *John W. D. Megaw*

GREENBERG M. PELLITTERI O. J. & JELLISON W. L. Rickettsialpox—a Newly Recognized Rickettsial Disease. III. Epidemiology. *Amer J Pub Health* 1947 July v 37 No 7 860-68 1 fig.

The authors describe the epidemiological conditions associated with the remarkable outbreak of rickettsialpox in the course of which the cause and mode of infection of this newly discovered disease were detected [see this Bulletin 1947 v 44 411 707 and 897]. Between January and October 1946 124 attacks occurred among about 2000 persons living in a housing development consisting of three blocks of buildings each of which was made up of 23 three-storied houses in which accommodation was provided at the rate of three or four rooms for each family. The affected locality was suburban in type it was 15 miles away from the centre of New York City and was surrounded at a distance by large lots of unkept grass weeds and scrub forest.

A few cases occurred early in 1946, but they were not diagnosed or were regarded as aberrant chickenpox. The highest incidence was in July and August. Persons of all ages, of various occupations, and of both sexes, were equally affected; the incidence was strictly associated with residence in the houses of the area.

A thorough investigation was carried out by the New-York-City Department of Health between July and October with the results already stated in the previous papers, from which it appears that the disease is caused by a newly isolated rickettsia—*R. akari*—which is transmitted by a mite—*Allodermanyssus sanguineus*—whose host, a house-mouse—*Mus musculus*—is a natural reservoir of infection.

The vector mites were found on the walls of incinerators and of some rooms in the buildings, also on house-mice which infested the irregularly used incinerators and the buildings in general.

From 19 houses in which mites were found, 67 cases were reported, whereas from 41 houses in which no mites could be found there were 42 cases.

The patients rarely knew that they had been bitten; none of them had seen a mite or insect at the site of the initial lesion.

Since the completion of the investigation, 20 additional cases were seen by the authors in four of the five city boroughs: most, but not all, of these cases were in buildings with incinerators, which, if irregularly used, were found conducive to mouse and mite infestation. In every affected house mice were found.

John W. D. Megaw.

YELLOW FEVER.

DURIEUX, C., BOIRON, H. & KOERBER, R. Sur l'existence d'un réservoir de virus amaril animal en Afrique. [The Existence of an Animal Reservoir of Yellow Fever in Africa.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 3/4, 111-18, 1 map.

During 1944, the authors examined the blood of 33 baboons, *Papio papio*,

against yellow fever, in other words the surprisingly high proportion of 88.2 per cent. of those examined. The results of the tests at Dakar during the past few years on 46 African monkeys, including 24 baboons, gave only one positive (a baboon from the French Sudan) and the results of other observers have never given proportions of infection reaching more than about 20 to 25 per cent.

The authors re-examined their sera with the use of the fractionating method, making separate tests with the serum-globulins and with the serum free from albumins. It was shown that the immune bodies were present in the serum-globulins, and that the positive results could not be explained by the presence of non-specific substances in the serum free from albumins.

It is evident that wild animals ensure the maintenance of yellow fever infection in certain parts of Africa and remain a permanent menace to neighbouring populations.

The authors advocate systematic vaccination as the simplest and most effective measure of preventing yellow fever outbreaks.

E. Hindle.

HADDOW, A. J., SMITHBURN, K. C., MAHAFFY, A. F. & BUGHER, J. C. Monkeys in relation to Yellow Fever in Bwamba County, Uganda. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, May, v. 40, No. 5, 677-700, 5 figs. [15 refs.]

In a previous paper [this *Bulletin*, 1942, v. 39, 759], MAHAFFY *et al* reported the isolation in 1941 of yellow fever virus from a human patient and from wild-caught mosquitoes, *Aedes (Stegomyia) simpsoni* Theob in Bwamba County.

the persistence of the disease among the wild animals of the area in the County

In a survey prior to the isolation of the virus from the mosquitoes, one of five red tail monkeys (*Cercopithecus nictitans nictitans* Matschie) was found to be immune to yellow fever. Since that time, continuous studies have shown

yellow fever immunity exists in (150) Bwamba monkeys were examined, chiefly by examination of blood smears. Twenty five monkeys were also used for protection tests and experimental work.

Fourteen species and subspecies of Primates have been found by the authors in Bwamba. The species important in relation to yellow fever are the red tail and the lowland colobus (*Colobus polykomos nilensis* Matschie). In juvenile and sub-adult age grades, immunity was low in all areas. Mosquito catches made in tree-tops in Bwamba have shown that the species chiefly suspected of being involved in the transmission of animal yellow fever in the forests are mainly arboreal. Consequently, it was at first thought that the more arboreal species of monkeys might show a higher incidence of immunity to yellow fever than those which spend much time on the ground, but it was found that the difference between the groups of partly terrestrial, mainly arboreal and arboreal monkeys was not significant. However, it still remains almost certain that transmission must occur mainly in the trees, for certain species which rarely descend to the ground show a very high incidence of immunity. It follows that the vector probably is most active at a time when all monkeys are in the trees, i.e. at night. Observation showed that all monkeys, including the partly terrestrial baboon, take up their sleeping posts about a quarter of an hour after sunset that *Aedes africanus*

main species involved in the monkey to-monkey yellow fever cycle of the uninhabited forest areas, that the red-tail monkey plays an important part in bringing the virus into contact with man and that the remaining species are of less importance in the local epidemiology.

The incidence of immunity increases with increasing age. In Bwamba, the incidence of immunity in the red-tail monkey is 27 per cent. Among the monkeys, the red-tail monkey supported the theory of naturally-acquired immunity. J. MacCallum

ANDERSON, C. R. & ROCA-GARCIA, M. The Reaction of Woolly Opossums (*Caluromys lariger*) to Yellow Fever Virus. *Amer. J. Trop. Med.* 1947, Mar., v. 27, No. 2, 161-76. [15 refs.]

In 1941, BUGHER and his colleagues [this *Bulletin*, 1941, v. 38, 434; 1944, v. 41, 475] found that marsupials of a number of different species were susceptible

to infection with yellow fever virus, and later suggested that marsupials may play an active rôle in the maintenance of jungle yellow fever. Most of the original studies were confined to *Didelphis marsupialis*, but, later workers [ibid., 1944, v. 41, 749] have used *Metachirus nudicaudatus* and *Metachirops opossum*.

The present authors have studied the effect of yellow fever virus on another species, the woolly opossum (*Caluromys laniger*). The animals studied were all trapped in regions of Colombia where yellow fever is endemic and where cases have been discovered within the past few years. Several different strains of yellow fever virus were used, but more than half the animals received a strain (*Chichimene*) isolated in a rhesus monkey infected by a bite of wild-caught *Haemagogus* mosquitoes.

Seventy-two (72) per cent. of the opossums were found to be susceptible to the virus on subcutaneous inoculation. None of the animals died of yellow fever, nor were any specific microscopic changes present in animals dying of other causes, but virus was detected in the blood stream for several days after inoculation in those animals classed as susceptible. The variation of susceptibility in relation to dosage of virus extends over a broad range.

Immunity in inoculated animals was determined by the results of reinoculation or estimation of neutralizing antibody in the serum by means of the intracerebral neutralization test in mice.

The majority of animals (94 per cent.) which had circulating virus later showed evidence of specific neutralizing antibody. Most of the animals developed detectable antibodies by the end of the second week, and the majority of animals actually showed their maximum response at this time, though in a few the maximum response did not occur till after 30 days. Following this response, some animals maintained their neutralizing antibody, but in others the antibody level began to decrease. There was no consistent relationship between the rate of disappearance of antibody and the intensity of the earlier response, or intensity of the infection. When the animals were reinoculated, the intensity of antibody, circulating virus was for

It was found that some animals w
neutralizing antibodies. Also a number of animals that were immune to reinoculation had lost their once detectable antibodies. In others, in which circulating virus had not been detected, neutralizing antibody appeared; this discrepancy may have been due to the lack of sensitivity of the test for detecting minute amounts of virus. No animal with a positive neutralizing test just before inoculation circulated virus.

F. O. MacCallum.

SNYDERS, E. P., POLAK, M. F. & HOEKSTRA, J. Jungle Yellow Fever in Surinam. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, July, v. 40, No. 6, 861-8. [15 refs.]

This is a continuation of previous studies of yellow fever in Surinam reported by SCHÜFFNER and his colleagues in 1938 [this *Bulletin*, 1939, v. 36, 18, 25]. In the hinterland, the results showed that 26 per cent. of 78 men but only 4 per cent. of 48 women of the Bush-Negroes had yellow fever immune bodies in their blood. The women tend to stay in the villages and the men are foresters, but even so, the villages are situated in the middle of the forest and it is remarkable that the rate is so low among the women. It is suggested that the vector may be a night-biting mosquito.

Though the number of sera examined was small, a different result was found in testing the aboriginal Indians. Here the rates for men and women practically the same (29 and 25 per cent. of 42 men and 16 women, respectively).

In the agricultural regions on the coast the plantations are situated near forest. Human infections are fairly common and probably of the jungle type.

is possible and the authors recommend *Aedes aegypti* control and mass vaccination

F O MacCallum

BRITISH GUIANA Yellow Fever Service Medical Department Annual Report 1946 [DE CAIRES P F Chief Officer] 11 mimeographed pp
1 map

The Yellow Fever Service of British Guiana [see also this Bulletin 1946 v 43 1136] ceased to exist as a separate organization at the end of 1946 becoming a part of the Mosquito Control Service from 1947 onwards. During

but the chief human factor was the high standard of efficiency maintained in the field staff of Inspectors. A bonus system for good work and ruthless dismissal of incompetent persons contributed to this end. The author remarks that a single incompetent inspector may and has cost the Government thousands of dollars and much loss of time.

It is interesting to note that houses sprayed in 1945 with 5 per cent DDT in kerosene at Plaisance remained free from *Aedes* 17 months later whereas these mosquitoes were constantly found in some 28 per cent of control houses. Phenothiazine is an efficient larvicide in water containers but does not control the breeding of *Culex* in pit latrines.

No case of yellow fever was reported in the Colony during 1946.

Charles J Wilcocks

BURRUS H W & HARGETT M V Yellow Fever Vaccine Inactivation Studies
Pub Health Rep Wash 1947 June 27 v 62 No 26 940 56 1 chart
[21 refs]

[In the early days of yellow fever vaccination the blood of most of the individuals injected was tested for neutralizing antibodies a few weeks later. If antibodies were not present a second dose of vaccine was given. When mass vaccination with the 17D attenuated strain of yellow fever virus was introduced such tests became impracticable but it was shown that if sufficient virus was given to each individual (500 mouse mld) at least 96 per cent developed demonstrable antibody in their blood and it is probable that the remainder also had some immunity. It was found that the 17D strain of virus was somewhat more thermolabile than the original pantropic or neurotropic strains but the exact behaviour of the 17D virus vaccine (serum free) at different temperatures was not known at the time it was required in large quantities. It was known of course that the virus survived better below $+4^{\circ}\text{C}$ than at higher temperatures and it was recommended that large batches of stock or seed vaccine should be kept at -5°C].

The authors have been carrying out detailed studies of survival time at different temperatures of the 17D virus in dried stock chick embryo water base yellow fever vaccine since 1942 which have provided valuable information for those who are involved in the production distribution and use of this vaccine both in temperate and tropical zones.

It was found that desiccation in a temperature of 20°C. to 25°C. ("room temperature") was cheaper and more convenient than, and practically as efficient as, at any other set of temperatures. Two hours' desiccation was containing 1 ml. of vaccine, and 6 hours' was ml. when the air around the ampoules was verage loss of 34 per cent. of active virus during desiccation at room temperature and 40 per cent. at -22°C. to +40°C.

Each of 20 desiccated vaccines held in storage at -9°C. to -32°C. for 3 years was still adequately potent for use at the end of that time. Vaccines stored at -5°C. to -7°C. and warmer showed considerable loss of active virus during a storage period of 2 years. For these reasons, it is recommended that desiccated vaccines be kept at -20°C. to -25°C. which can now be done at a reasonable cost.

Adequately desiccated vaccines may still be sufficiently potent for use after an exposure of several weeks to a tropical temperature. When several batches of vaccines were exposed at 37°C., an average of 90 per cent. of virus was lost in 2 weeks, and 99 per cent. in 8 weeks. A very small amount of active virus was present after 104 weeks. An interesting observation was that in each of 8 different lots of vaccines, there was an increase in titre after exposure for 7 or 8 hours at 25°C. to 37°C. An exposure of 8 hours at 100°C. and 7 hours at 110°C. was required to inactivate all virus.

A useful point for those concerned with inoculation of large groups of people was the finding that vaccine diluted 1:1 to 1:100 with saline remained adequately potent for 6-20 hours at 37°C. However, it is recommended that 1:1 and 1:10 suspensions be used within 1 hour of preparation and 1:100 suspensions within 10 minutes.

F. O. MacCallum.

DENGUE AND ALLIED FEVERS.

WILBAR, C. L., Jr. Control of Dengue in Hawaii. *Amer. J. Pub. Health.* 1947, June, v. 37, No. 6, 663-74, 4 figs.

Dengue had not been known to occur in Hawaii since 1912, so that when the disease appeared in Honolulu in July 1943 it was feared that a great epidemic might occur and that the war effort might be seriously hampered. Accordingly, very elaborate measures of control were adopted; these at one period involved the employment of nearly 400 persons, who carried out the usual methods of mosquito destruction and the spraying of houses and their surroundings with pyrethrum and DDT insecticides.

In Honolulu there were 1,496 cases with three deaths among the population of about 250,000 persons. In the rest of Hawaii, with a similar population, there were only two cases.

The epidemic reached its peak in October 1943, and thereafter declined rapidly so that only sporadic cases occurred after mid-December 1943. After the middle of 1945 no further cases were reported.

The *Aedes*-breeding index in Honolulu was reduced within two months from 5.7 per 100 houses in September 1943 to 1.0 per 100 and was then maintained at the lower level. [From the chart it appears that the index rose to 3.5 in early April 1944 without being followed by a recrudescence of the epidemic.]

John W. D.

DIPOFT Maria & TEODORESCU Ana Maria Contribuţiuni la stud
phlebotomilor în România [A Study of *Phlebotomus papatasi* in Ruman
Rev Stiintelor Med Bucharest 1946 Jan-Apr v 35, Nos 1/4 46-
3 figs French summary

The authors report the appearance of *Phlebotomus papatasi* in relatively lat
— — — — — During 1

The B dul Basarab urea near the Gare # 1, 1946
established had been heavily bombarded and there were a number of heaps
rubble which probably constituted larval breeding places Furthermore t
unusual heat and dryness of the Mediterranean climate during the year we
— — — — —

urred and were easily mistaken for oth
H J O D Burke Gaffney

ANDREY L A [Contribution to the Question of Sandflies and Sandfly Fev
in the Province of Alma-Ata] Izv kazakh Fil Akad Nauk Alma At
[Ser zool] 1943 No 2 30-33 1 fig [In Russian English summary
p 120] [Summary taken from Rev Applied Entom Ser B 1947 Jul
v 35 Pt 7 111]

Over 200 sandflies collected between 26th June and 12th August 1939 :
houses in the town of Alma Ata in south eastern Kazakhstan and in villages i
adjoining foothills c
chinensis Newst
but none hatched
flies are present in this region from mid June to mid August and it is
in the first half of July They attack man commonly and probably no
domestic animals as they were not found in stables or cattle sheds It is no
known whether any disease transmitted by sandflies occurs in the area

PLAGUE

TOMICHI P Q Preliminary Sylvatic Plague Studies in the Suez Canal Zone
J Roy Egyptian Med Ass 1947 May v 30 No 5 239-46

An attempt has been made by the author to investigate the existence o
sylvatic plague in the Suez Canal Zone by examining rodents caught in village
and in the desert In spite of the general opinion that plague in the Canal Zone
— — — — — the does not exclude the possibility that it may
no evidence however has been
story was selected for examina
of which Fayed village was the
from the desert by the Swee
— — — — — the domestic rodents

In this investigation, 119 rodents were examined for plague infection—56 domestic rats (*R. rattus* and *R. norvegicus*) and 62 desert gerbils and jerboas, with one *Mus musculus*. The fleas were mainly of the genera *Xenopsylla* and *Echidnophaga*. This is only a preliminary study of an important region and the conclusion so far reached is that "there is no evidence of plague infection at the present time among the various species of rodents collected."

W. F. Harvey.

MACCHIAVELLO, A. Reinfeción pestosa de puertos peruanos por importación de sacos de yute provenientes de la India. [Plague-Infected Fleas in Bales of Jute Bags Imported into Peru from India.] *Bol. Oficina Sanitaria Panamericana*. 1947, Mar., v. 26, No. 3, 225-8. [18 refs.] [English version 228-30.]

As long ago as 1934 LONG and MOSTAJO [this *Bulletin*, 1935, v. 32, 448] put forward their conclusion that infected fleas could be the agency of direct introduction of plague into a country without even need for assuming that the

present study brings support and proof for Long and Mostajo's explanation. That being so, it may be necessary to revise other explanations commonly adduced for the introduction of plague into South America, as for example that which occurred in 1904 when the steamer "Gladstone" with a cargo of jute bags brought plague to Antofagasta, Chile. During the present world war, jute bags were imported into South America in great quantity and with much less supervision over disinfection than previously. Fleas of the genus *Xenopsylla* were found in bags in the course of importation into Peru. The bales had had no opportunity in transit for local contamination or infestation and no plague had existed locally for a number of years, while the fleas, all in a fasting condition, were taken from the interior of a bale; some were found alive and some dead. A triturate of the fleas inoculated into a guineapig required four passages in series to produce attenuated plague, but the plague bacillus was isolated. Later still, under similar circumstances, another batch of fleas was collected, of which 8 *X. cheopis* were alive. "Six of these fleas were fed on one guinea pig which died of plague. The survivors of these fleas continued to feed on a second guineapig which also died of plague." The conclusion drawn is

at length, and the probability of this mechanism is rejected. W. F. Harvey.

INDIAN RESEARCH FUND ASSOCIATION. REP. SCIENT. ADVISORY BOARD FOR YEAR 1ST JAN. TO 31ST DEC., 1946. 49-52. [Plague.]

The keeping qualities of plague vaccine are of great importance wherever it is used or manufactured casein hydrolysate and estimation of the size of the dose, if any, superiority over the other. The casein hydrolysate had an initial protective dose of 0.003 ml. and the agar vaccine 0.004 ml. A decided deterioration became manifest in both vaccines at the higher temperature. At 0°C. the dose was, for the former, still no higher than 0.0046 ml. and for the latter 0.0056 ml. after 20 months, but at 37°C. it had risen in the two cases to 0.014 and 0.015 ml. respectively.

Much is expected from the use of DDT in disinfection, and yet it should not be used indiscriminately, for its action on fleas in natural rat burrows is dependent on adequate distribution and proper mixing with the burrow debris. In

DDT because it penetrates tortuous rat burrows and kills both rats and rat fleas.

W F Harvey

CHOLERA

PANJA, G & GHOSH S K Isolation of Cholera Vibrios from Hooghly River Water at Calcutta *Indian J Med Res* 1947, Jan, v 35 No 1, 1-2

"Out of 524 samples of Hooghly river water 16 showed true *Vibrio cholerae* when examined by the candle-bone peptone water method of Panja. Other methods tried were less satisfactory [See this *Bulletin* 1943, v 40, 241]"

CHATTERJEE, H N A Study of the Postmortem Bone Marrow from Cholera Cases *Trans Roy Soc Trop Med & Hyg* 1947, July, v 40 No 6, 905-8 5 figs on 2 pls [12 refs.]

This paper represents a continuation of studies reported by the author [this *Bulletin*, 1939 v 36, 902] in which he described the pathological changes in the bone marrow in specimens from 25 cases of cholera. A further 15 cases constitute the material of the present study.

The characteristic microscopical finding was a great dilatation of the capillaries and of the sinusoids which could be studied readily owing to the widening of the capillaries.

This capillary distension was seen in many other internal organs also, but it was quite remarkable in the bone marrow amounting in some cases to a dilatation in diameter of 15 to 20 times or more. It is suggested that the capillary changes may perhaps partially explain the extreme shock and collapse seen in cholera.

Leucoblastic reaction was constant but variable. Eosinophiles in the marrow averaged 15 to 20 per cent. Lymphatic nodules were found in a few cases.

Dilatation of the bone marrow capillaries is also found in epidemic dropsy,

is no eosinophilia [presumably no increase in eosinophiles in the bone marrow, the eosinophilia may be considerable]

The first group of cases was tested by the method of Panja and Ghosh.

INDIAN RESEARCH FUND ASSOCIATION REP SCIENT ADVISORY BOARD FOR
YEAR 1ST JAN TO 31ST DEC 1946 1-4 [Cholera]

This report relates both to studies projected and to experiments which have not yet yielded satisfying results. Treatment of cholera proceeds on the lines of evaluation of sulphonamide drugs and two sets of trials have been made, in the field and in Calcutta. If, rather arbitrarily, the several trials are combined,

it appears that : (1) In the field 35 patients were treated with sulphaguanidine and 36 with a placebo, there were 6 deaths in the sulphaguanidine and 14 in the placebo series. (2) In Calcutta, out of 303 patients treated with sulphaguanidine (15 gm. 5 gm. daily) 2 deaths out of

In laboratory examination of stools 320 cholera strains were isolated, 88.1 per cent. of Ogawa and 11.9 of Inaba subtype. It was found to be easy to prepare monospecific Ogawa "O" agglutinating serum, but difficulty was encountered in the case of Inaba because it showed considerable reduction of titre by absorption with Ogawa strains.

An interesting investigation is in progress to find whether the glucolipidic antigen fraction of LINTON and his co-workers; the "antigène glucolipidique" of the French school, and the "specific antigen" of WHITE, are identical or different. *W. F. Harvey.*

PANJA, G. & DAS, N. N. Immunity after Intradermal Inoculation of Cholera Vaccine. *Indian J. Med. Res.* 1947, Jan., v. 35, No. 1, 3-6.

"A preliminary study on the intradermal inoculation of cholera vaccine in human subjects was carried out with encouraging results and these have received support from certain observations on experimental animals. Further work is indicated."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

WILLIAMS, T. H. Intestinal Parasites in the Canadian Armed Forces. *Canadian Med. Ass. J.* 1946, Mar., v. 54, No. 3, 249-52.

The author examined 500 returned Service men for intestinal parasites: all of the patients had been in the Mediterranean, Far East and other sub-tropical areas. Three specimens were tested in each case: examination was by direct smear and by zinc sulphate flotation when the former was negative; motile specimens were stained by Quesnel's stain. Strict criteria were employed for the identification of protozoal species.

Entamoeba histolytica was found in 13 per cent. of patients, *E. coli* in 21.8, *E. nana* in 6, and *I. butschlii* in 2 per cent. Of the flagellates, *Giardia intestinalis* accounted for 7.4 per cent. of findings. Helminths were less than 1 per cent., except *Trichuris trichiura* which amounted to 1.6 per cent. The low degree of helminth infection was surprising.

The author notes that a heavy *Giardia* infection was often the only finding in patients with recurring attacks of loose stools; he is convinced that this flagellate is mildly pathogenic in certain cases; the infection was usually cleared with mepacrine, 0.1 gm. three times daily for 5 days.

The author states that infection with *E. histolytica* was very high in persons returned from North Africa [the percentage was 28.57, but in fact this represents only 6 persons out of 21].

By means of three examinations on alternative days, *E. histolytica* was found in 60 per cent. of occasions on the first, 26 per cent. on the second, and 14 per cent. on the third examination.

As the infection is rare in Manitoba, the author, in co-operation with the R.C.A. and the R.C.A.F. obtained three specimens on alternate days from 100 members of the Forces who had enlisted recently and had not left

Only 2 per cent showed *E. histolytica*. The figure for *E. coli* was 22 per cent which was almost identical with that (21.8) found in those who had been abroad. Other amoebae accounted for 7 per cent of findings. The author concludes from his experience and that of other workers that the incidence of pathogenic amoebae in Canada is about 1 per cent (but the figures attributed to MILLER (this Bulletin 1940 v 37 113) do not conform with those in Miller's paper).

A note of interest is the author's observation that no procedure of examination of specimens for protozoa can equal the proficiency gained by experience in recognition of the various protozoa and cysts. He has repeatedly found protozoa in direct smears which were missed in flotation procedure [see also HILL this Bulletin 1947 v 44 901].

Patients were treated successfully for *E. histolytica* infection by means of emetine and carbarsone or alternatively by diodoquin which was less toxic.

H J O D Burke-Gaffney

SCHEVNOVICH V B & SMIRNOVA E N [Observations on the Discharge of Cysts of *Entamoeba histolytica*] *Med Parasit & Parasitic Dis* Moscow 1946 (1947) v 15 No 6 82 7 3 figs [In Russian]

It is a well known fact that the discharge of active forms and cysts of

of infection it is important from the epidemiological point of view to study the dynamics of the discharge of cysts in such persons. With this object in view the authors undertook prolonged observations on three carriers who have

number of cysts was counted at a magnification of $\times 400$ over the whole ruled area. The mean of three successive counts was estimated for 1 cc of the 1 per cent suspension. The results of these observations are shown in a series of

course of two to three days. There were negative days when no cysts could be detected in the stools even after concentration.

The output of cysts was also subject to individual variation. Cases A and C sometimes discharged enormous numbers of cysts and continued to do so for long periods of time but in 8 per cent of tests no cysts were present while in 23 per cent of tests their number was very slight. In case F cysts were continuously present in large numbers (up to 4 000 per 1 cc of 1 per cent suspension) during the first 30 days of observation. This period was followed by 3½ months in the course of which cysts were either absent or very scanty, the

patient in the course of a month may fail to reveal an existing infection. Furthermore, the enormous numbers of cysts which are daily discharged by some carriers must be of the greatest epidemiological importance, especially under unsatisfactory sanitary conditions. On the other hand, the finding of scanty cysts in some carriers is not a justification for disregarding them as a source of dissemination of cysts.

C. A. Hoare.

ROBERTS, ENID W. The Part played by the Faeces and Vomit-Drop in the Transmission of *Entamoeba histolytica* by *Musca domestica*. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 129-42, 4 figs. [27 refs.]

The experiments described in this paper confirm previous work regarding the number and persistence of *Entamoeba histolytica* cysts in the faeces of flies (*Musca domestica*) having access to stools containing these organisms; the results also show that the cysts are deposited in the vomit drops, an aspect of the subject that has hitherto received little attention.

After reviewing the literature and describing her experimental technique, the author gives an account of the results of her experiments. These show that of 107 flies fed on a standard emulsion of *E. histolytica* cysts prepared from patients in hospital, 68 flies passed 147 faecal drops containing 1,792 cysts during 31 hours' observation. Cysts were noted in the fly faeces as early as five minutes after feeding and were recorded at all times during the period.

Of the same flies, 69 passed vomit-drops containing cysts. From 20 flies, 312 vomit drops were obtained during a period of nine hours; of these, 163 (52 per cent.) were negative, 100 (35 per cent.) contained one cyst, 27 (8 per cent.) contained two cysts, and the remainder three to eight cysts.

Observations were made on the fly's method of feeding on *E. histolytica* emulsion in three forms—as a liquid, as a thick, viscid film, and as a thick, completely dry film. In the first, the fluid was sucked up the opening between the labellae; each time the proboscis was removed from the food, a residue of debris which remained attached was dislodged and left on the slide; this residue was seen to contain a concentration of cysts. By the second method, more food was seen to enter by way of the pseudotracheae, the opening to the food canal being reduced. In the third method, the main food canal was almost completely closed and the food passed up the pseudotracheae.

To determine the size of the organisms which when fed to the fly may subsequently appear in the crop, and also the size of the organisms which may appear in the cysts (8 to 13; 8 per field) and 25 per field). Twenty-four flies were fed, eight on each organism; five from each group were dissected immediately after feeding, and three from each group were kept alive for examination of the vomit drops.

The dissections showed that the crops of the five fed on *E. histolytica* contained cysts (4 per field); those fed on *E. coli* contained cysts (6 per field) and in the case of *Eimeria acervulina* the crops contained oöcysts (10 per field). These results suggest that particles larger than 12μ tend to be filtered off on the way to the crop. Of the nine flies kept alive, the three fed on *E. histolytica* emulsion passed 57 vomit drops containing 30 cysts, those fed on *E. coli* passed 51 drops and only one cyst (12μ in diameter), while no oöcysts of *Eimeria* were found in 47 vomit drops deposited by the three flies fed on this organism, thus suggesting that the majority of the *E. histolytica* cysts which enter the crop are held back by the pseudotracheae when the fly vomits.

are not

glands This is merely conjecture as the route has not been ascertained with certainty
H S Leeson

PARVIS D Sull accertamento diagnostico dell amebiasi e su un metodo rapido di colorazione delle amebe intestinali [Diagnosis of *E histolytica* a Rapid Method of Staining Intestinal Amoebae] *Ann d Igiene* 1942 Oct v S2 No 10 458-64 [11 refs]

The only certain diagnosis of *E histolytica* infection depends on finding the active amoeba or its cysts in the stools Other laboratory methods of confirmation—cultivation complement fixation animal experiment presence of Charcot Leyden crystals—may prove negative particularly in the case of carriers The surest method is examination of the fresh stool failing that staining by Weigert's iron haematoxylin has proved satisfactory in the author's experience This is a modification of Heidenhain's method and results in much saving of time for there is no need of a mordant

The details are briefly these Fixation in Schaudinn's fluid 20 minutes (longer is immaterial it does no harm) alcohol (70 per cent) with Tr iodine to a sherry colour 20 min alcohol (70 per cent) 30 min wash in water 2 min stain with Weigert's haematoxylin 3 min wash in running water 5 min (or more) dehydrate clear and mount 20 min The whole process takes 1 hour 40 min whereas Heidenhain's takes some 3-4 hours

H Harold Scott

THERON P Surgical Aspects of Amoebiasis *Brit Med J* 1947 July 26 123-6

The mortality rate after operations on patients with untreated amoebic infections is considerable owing to (a) reduced resistance leading to increased liability to post-operative complications hypoproteinaemia is frequent in

lating severe bacillary dysentery during the immediate post-operative period (e) occurrence of a mild hepatitis during the post operative period Every candidate for operation who has served in the tropics whether he gives a history of dysentery or not should have a stool examination and possibly a sigmoidoscopy

Atypical acute hepatitis must be distinguished from acute cholecystitis tenderness and resistance may be present in the right upper quadrant and the signs may be vomiting constipation and tenderness in the right upper quadrant The clinical picture may change in one or two hours so examinations should be repeated at short intervals The lower thoracic region should be examined by palpation gentle fist percussion and auscultation In the presence of constipation a stool may be unobtainable so sigmoidoscopy should be done in all doubtful cases Moderate leucocytosis with a polymorphonuclear count of only 75-80 per cent is characteristic Radiological screening may show the right cupola of the diaphragm elevated and fixed if abscess formation has occurred If doubt

and the dysentery may antedate the hepatic lesion by as much as 15 years Although general debility loss of appetite and progressive emaciation are

characteristic, many cases are recorded in which the diagnosis was established only after an apparently symptomless abscess had ruptured into the lung or general peritoneal cavity. Pyrexia is often inconstant or absent and adhesions may prevent downward enlargement of the liver. Leucocytosis is present in over 80 per cent. of cases, acute hepatitis. Screening diaphragm, with obliterated inoeous effusion at the rig

The general adoption of the emetine and aspiration treatment reduced the mortality from over 40 to 6 per cent., but open operation is still indicated in the presence of secondary pyogenic infection, where the abscess points on the abdominal wall or in an intercostal space, in cases where repeated aspiration has failed to cure, or when the abscess has ruptured into the peritoneal cavity. Closed drainage and local and parenteral penicillin are advised.

Perforation of a single ulcer of the colon usually leads to localized abscess. Four out of five of the author's cases recovered after simple incision and drainage. The friability of the colon renders treatment in the early stages difficult, and exteriorization, rather than closure by suture, is indicated.

Multiple perforations with general peritonitis may follow an acute attack superposed on chronic amoebic colitis, and it is usually stated that they are invariably fatal. The patient is very toxic, with a high temperature and severe diarrhoea, with *E. histolytica* in the stools, and does not respond to emetine or chemotherapy. Increasing tenderness over the caecum and pelvic colon are followed by accumulation of intraperitoneal fluid with little guarding or rigidity, finally there is sudden collapse. Post-mortem examinations on 15 cases showed an average of 5 perforations per case, with the caecum the commonest site; an important point noticed was a tendency by the omentum to seal off the perforations. The treatment advised is plasma transfusions, injections of 2 ml. of adrenal cortical extract at intervals of one hour, a small muscle-cutting incision and either a double-barrel ileostomy or a caecostomy with passage of a $\frac{3}{4}$ in. rubber tube into the ileum; post-operative treatment consists in intestinal decompression, intravenous fluid and sulphathiazole; emetine was not given for the first week. Seven of 15 patients operated on recovered; 12 not treated by operation all died.

Amoeboma. Fibrosis due to secondary infection may prevent a satisfactory response to emetine, and in such cases the diagnosis can only be made by microscopy after resection.

Acute typhilitis may present a clinical picture indistinguishable from that of acute appendicitis, and in spite of a careful history the element of doubt will necessitate laparotomy in some cases. Obstruction or interference with blood supply is the only indication for appendectomy in the presence of active amoebiasis. To minimize the risk of faecal fistula, the stump of the appendix should be line reinf. gutter.

Intestin.
met with

following resection; the other, aged 54, recovered after exteriorization of the mass and drainage of the abscess.

Ileo-caecal intussusception due to inflammatory thickening of the colon may occur, and four such cases in adults are described. Two were fit for operation: in one case reduction was easy, in the other it could not be completely effected, so an ileo-transversostomy was made after sealing off the point of entry of the intussusception by suture; the devitalized portion of the intussusceptum was passed per rectum ten days later. Both patients recovered.

[DUNLOP writing of the treatment of severe cases of chronic dysentery amongst prisoners of war in Siam (this *Bulletin* 1946 v 43 558) described 14 patients treated by ileostomy of whom 3 died 7 recovered completely and the others were improved]
H L Harnett

CLUER E H Granular Proctitis treated with Succinyl-Sulphathiazole Suppositories *Lancet* 1947 Aug 2 168-70

Granular proctitis occurs as a late complication of or concurrently with dysentery affecting the lower bowel. It has to be differentiated from chronic bacillary dysentery, chronic intestinal amoebiasis, mucous colitis and low grade chronic idiopathic ulcerative colitis. Three cases are reported of differing aetiology. The first resulted from chronic bacillary dysentery contracted during the war in Palestine, the second resulted from amoebic dysentery contracted in Persia, and the third developed after haemorrhoidectomy without any definite microbial infection.

Hitherto granular proctitis has proved most resistant to treatment which is amply demonstrated by the multiplicity of therapeutic agents.

No reference has been found to the use of sulphonamide suppositories in British medical literature though HOWARD (1945) in America has recorded the application of intrarectal powdered sulphonamides in non specific rectocolitis. Sufficient time has not yet elapsed for an accurate estimate to be made

for twenty four hours. On the other hand sulphonamide retention enemas can at best exert a temporary effect. Furthermore the patient need not be kept in hospital after the diagnosis has been established.

In a note on the preparation of succinyl sulphathiazole suppositories by

red to form a smooth paste before the rest of the cocoa butter was added when poured into the moulds and set the finished product was a little over 2 in long and $\frac{1}{2}$ in in diameter.

Since there is no standard metal mould for such a suppository glass tube moulds were made by removing the ends of test tubes $\frac{1}{2}$ in in diameter.

The suppositories are stored wrapped in Cellophane and kept well at room temperature.
P Manson Bahr

BRELET M Note sur le pronostic de la dysenterie amibienne [The Prognosis of Amoebic Dysentery] *Rev. Paludisme et Med. Trop.* 1947 June 15 v 5 No 37 183-8

The author modestly disclaims any deep scientific motif in this study of amoebic dysentery. This is a simple account made in the special centre in Nantes for the purpose of assessing the pension of veteran soldiers with amoebic dysentery contracted in Syria and Morocco from 1916 to 1918.

The statistics concern 100 cases which can be taken as an index for assessing the whole. The author can positively assert that numerous sufferers from chronic amoebic dysentery recover completely. This point is not sufficiently emphasized in the many classical accounts of this disease during the last

thirty or forty years. The tendency to relapse is sufficiently emphasized but not the possibility of spontaneous recovery. Thus, out of the 100 test cases, no less than 44 terminated in complete recovery, which has been maintained.

Three dysenterics were operated upon for liver abscess and recovered entirely without further treatment, and it is suggested that the hepatic suppuration acted as a fixation abscess.

Of the 60 cases which could still be regarded as ill, in only 15 has it been possible to ren-
well disturbances of the

As an example of the continued persistence of *E. histolytica*, the case of one pensioner is recorded in whom *E. histolytica* cysts were demonstrated in 1918 and who, though in good physical condition, continued to harbour them till 1932. Other cases recorded were less fortunate. Pulmonary tuberculosis complicated the picture in 9 dysenterics.

Several also were infected with malaria as well as with amoebic dysentery, but on later examination no stigmata of the former could be found. The conclusion is reached that malaria is more easily cured than dysentery.

P. Manson-Bahr.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

BALTAZARD, M. Identification des spirochètes récurrents. Individualité de l'espèce *Spirochaeta recurrentis*. [The Identification of Relapsing Fever Spirochaetes. The Individuality of the Species *Spirochaeta recurrentis*.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 3/4, 77-81, 4 figs. on 2 pls.

The author finds that under dark ground illumination, *S. recurrentis* presents an appearance of uniform refraction which enables it to be distinguished from spirochaetes transmitted by ticks, which show a double contour [see this *Bulletin*, 1947, v. 44, 906].

Two photographs of *S. persica* and one of *S. gallinarum* are reproduced to show the appearance of tick-transmitted spirochaetes, and one of *S. recurrentis*, for comparison. [It is difficult to decide what interpretation to place on these appearances, although they do suggest some difference between the two kinds shown, possibly the result of variation in the diameter of the organisms.]

The well-known feeble pathogenicity of *S. recurrentis* in white mice has been partly overcome by the use of splenectomized mice, in which the infection is of longer duration. Out of 51 splenectomized mice inoculated with the spirochaete after various numbers of passages, 19 died or were killed at the end of infection; of the 32 others, 2 had an infection of 2 days' duration, 11 of 3 days, 12 of 4 days, 5 of 5 days, and 1 of 6 days. Out of 21 normal mice inoculated as controls, 4 showed no spirochaetes in the blood, 4 an infection of 1 day, 6 of 2 days, 5 of 3 days, and 2 of 4 days. The number of organisms in the blood was about the same in both series, rarely more than 2 per field, and the true receptivity of the mice was not altered by splenectomy. Moreover, 18 passages in splenectomized mice did not have any effect on the virulence of the spirochaetes.

S. recurrentis is considered to be a very distinct form of relapsing fever spirochaete, cosmopolitan in distribution, distinguished by its epidemicity, method of multiplication in the human blood, its development in the louse, its failure to persist in *Ornithodoros*, its feeble or non-pathogenicity to small laboratory animals, and finally its uniform refraction under dark ground illumination.

E. Hindle.

PROVOST, C. & FLANDRIN, J. Trois nouveaux cas de fièvre récurrente hispano-africaine en Tunisie (Complications neuro-oculaires) [Three New Cases of Relapsing Fever in Tunisia, with Neuro-Ocular Complications.] *Rev. Méd Nat (Métropole et Outre-Mer)* Paris 1947, v 2 No 2, 139-45

KALFAYAN, B. H. *Leptospira icterohaemorrhagiae* in Rats of Beirut. *Trans Roy. Soc Trop Med & Hyg* 1947, July, v 40, No 6, 895-900

The finding of two cases of Weil's disease in the hospital of the American University of Beirut led the author to survey the local incidence of leptospirosis in wild rats and to evaluate the best methods of examination, with special reference to possible kidney changes brought about by leptospirae.

Seventy wild rats were trapped in different places in Beirut between May 21st and October 8th 1945, of these, 65 were *Rattus norvegicus* and 5 were *R. alexandrinus*.

Both kidneys were removed and one was divided into two, for silver-impregnation and for haematoxylin-eosin staining respectively. The other kidney was emulsified in saline, and the emulsion was examined under dark-field illumination. Positive or suspicious specimens were cultured and inoculated into young guinea-pigs. The infected guinea-pigs either died in 5 to 10 days or were killed on the 10th day and examined at once, by methods similar to those employed in the case of the rats.

The following table summarizes the results of the examination of the kidneys and in one of the rats under 20 cm. (2 years old). The author reports that in all cases the kidneys were examined by the methods described above.

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which only revealed 4 positive cases

In 8 rats *Trypanosoma lewisi* was found by dark-field illumination of kidney emulsions. Seven of these rats were *R. norvegicus* and all of them were under 20 cm, confirming the belief that this infection is commonest in young rats.

In 3 rats the nematode *Trichosomoides crassicauda* was seen in sections of the kidney pelvis, in the form of a larva, a small adult male and a larger adult female, respectively; these were identified in haematoxylin-eosin preparations.

In the case of the 70 rats, the kidneys were examined by the methods described above, and in different parts of the same kidney.

Haematoxylin-eosin sections of the 70 kidneys showed glomerulo-nephritis in 14 cases; this was seen only in the older rats (above 18 cm. in length). In

one of these occurred in older rats. The pigment was found in all of the 8 kidneys positive for leptospirae and was abundant in 7 of them. The pigment was present in the 14 nephritic kidneys and was abundant in 9 of them. The author considers it likely that the brown pigment was deposited in previously damaged cells.

The leptospirae could not be recognized individually by haematoxylin-eosin stain, but when they were abundant, the bluish mass which filled the lumen was distinctive. No histological difference was seen between the cells of the tubules infected with leptospirae and those which were not.

In conclusion, the author considers that demonstration of leptospirae in silver-impregnated kidney sections was the most reliable of the methods used in this survey.

H. J. O'D. Burke-Gaffney.

PATTERSON, H. M. *Weil's Disease. Observations in Sixty-One Cases with special reference to the Use of Penicillin in Six Cases.* *J. Amer. Med. Ass.* 1947, July 26, v. 134, No. 13, 1077-80. [12 refs.]

The author previously gave a general report of observations in 37 cases of Weil's disease [see this *Bulletin*, 1945, v. 42, 42], and in the present paper discusses the management and treatment of this disease in a larger series of 61 cases.

Blood serum agglutination tests were performed on the 1st, 8th and 15th days after admission to the hospital. The tests were negative on the 1st day; usually showed no titre, or a low one, on the 8th day, and a high titre, or a rising one, on the 15th day. Nearly all the infections in Hawaii were found to be due to *L. icterohaemorrhagiae*.

A record of the patients shows that 44 received no special treatment, 7 sulphathiazole, 6 penicillin, 2 whole blood from donors who had recovered from Weil's disease, and 1 each with blood and either sulphathiazole or sulphadiazine. All the patients recovered, whether treated or not, and it is difficult to understand the author's statement that "the use of transfusions of whole blood from donors who have had Weil's disease should be the sheet anchor in the treatment of the severely ill patient", based apparently on the clinical symptoms of these cases, all severe. The author's results support the view that sulphonamide compounds are not effective in this disease, but that treatment with penicillin is beneficial.

E. Hindle.

YAWS.

FLOCH, H. & DE LAJUDIE, P. *Traitement pratique du pian par la pénicilline en suspension dans de l'huile d'olive.* [Treatment of Yaws with Penicillin suspended in Olive Oil.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 1/2, 8-14.

The authors report four cases of secondary yaws (French Guiana) in whom clinical, but not serological, cure followed 100,000 Oxford units of sodium penicillin in sterile olive oil. The dosage was 1 ml. of oily suspension, containing between 10,000 and 15,000 units, daily for seven days. Its intramuscular administration was well tolerated. The activity of the suspension to *Staphylococcus aureus* was maintained after storage in an ice-chest for seven days. [See also DWINELLE *et al.*, this *Bulletin*, 1946, v. 43, 1043.]

C. J. Hackett.

LEPROSY.

COCHRANE R G A Practical Textbook of Leprosy

This book is reviewed on p 1026

CHALSSINAND M La transmission en série de la lèpre humaine aux animaux n'est pas réalisable par le procédé d'Ota [Failure to transmit Human Leprosy serially to Animals by Ota's Method *Ann Inst Pasteur* 1947 July v 73 No 7 682-4]

FITE, G L CAMBRE P J & TURNER, M H Procedure for demonstrating *Lepra Bacilli* in Paraffin Sections. *Arch Pathology* 1947, June, v 43, No 6, 624-5

The lesser "acid fastness" of *Mycobacterium leprae*, compared with *Mycobacterium tuberculosis*, makes it difficult to stain appropriately in paraffin sections FARACO

though effective

They have obtained satisfactory results, irrespective of the techniques of fixation and embedding with the following method, which it is also stated, should do well with tubercle bacilli —

1. Stain (1 to 2 minutes each) of a mixture of

3 If mercury crystals are present, remove them with strong iodine solution (2 minutes), followed by hyposulphate or thiosulphate solution Wash in tap water

4 Stain cold for 15 to 30 minutes in any standard (but not concentrated) carbol fuchsin Wash

5 Decolorize with 1 per cent concentrated HCl in 70 per cent alcohol to a faint pink colour One to 2 minutes will be required Wash

6 Counterstain with Loeffler's alkaline methylene blue for 30 seconds Wash in tap water

7 Blot, stand until dried out and mount in a synthetic mounting medium

The oil hastens acid fast staining and more regular staining results without the use of heat The residual oil left in the sections after blotting prevents shrinkage and injury of the preparation almost any oil will serve, though volatile oils are less useful If a larger proportion of oil is added to the xylene, decolorization becomes more difficult

The method "succeeds admirably with tissues indifferently fixed or embedded years previously where other procedures fail miserably

H J O D Burk-Gaffney

HELMINTHIASIS

Hsu, K C A Survey of Human Intestinal Parasites in Chengtu, Chinese Med J Shanghai 1947, Mar-Apr v 63, Nos 3/4, 85-90 [18 refs]

A number of workers have studied the incidence of intestinal parasites in Chengtu, in the Szechwan Province of China The present author has studied the intensity of infestation in three groups of persons, namely (1) university

servants and their households (368 persons); (2) university freshmen students (337); (3) primary school children (471). He compared his findings with those previously reported by CHANG *et al.* [this *Bulletin*, 1941, v. 38, 375; 1943, v. 40, 851]. All specimens in the second and third groups were examined by

Ascaris lumbricoides incidence was high among schoolchildren (85.3 per cent.) and relatively lower (46.8 per cent.) among freshmen; in the servant group it was 68.7 per cent. Egg counts varied from 220 to 340,000, with a mean of 11,745 per cc.

Hookworm infestation was less than 1 per cent. in the schoolchildren and freshmen, but 17.3 per cent. in the servant group. Egg counts were from 200 to 19,600 with a mean of 2,106 per cc.

Trichuris trichiura was 2 per cent. in freshmen, 8.2 per cent. schoolchildren and 33.6 per cent. in the servant group.

Clonorchis sinensis was found in only 7 of the servant group and 2 of the freshmen. It is noted that raw fish is not ordinarily eaten in the province.

A single case of *Hymenolepis* infection in a schoolchild is believed to be the

Entamoeba histolytica accounted for only 1.7 per cent. of findings, being under 1 per cent. in the second and third groups, but it was 4 per cent. in servants. *E. coli* was also higher in servants, being 16.5 per cent. compared with 7.4 and 6.7 for schoolchildren and freshmen. Infestation generally was higher in servants, who suffered from as many as 4 or 5 species of parasites in some cases.

H. J. O'D. Burke-Gaffney.

SCHWETZ, J. No.

Exploitation

[Malaria and S.

the Bushimaie

1947, v. 18, No. 1, 307-18, 1 map.

Bakwanga lies to the north and Tshimanga to the south of the Bushimaie Valley. The former is a post at which there are some 7,000 workers in the mines, well housed, and who with their wives and families amount to 15,000-20,000 inhabitants, distributed in camps at a perimeter of 5 kilometres round the European quarter. In this area are many craters of varied size, filled with water. Mosquitoes are fairly numerous; more than four-fifths are *A. funestus*, 4.5 per cent. *A. gambiae* and 3 per cent. *A. nili*. The blood of 46 children under 10 years of age at one camp (Lomuele) was examined by thick drop and 34 of them showed malaria parasites, mostly *P. falciparum*, a few *P. malariae*, no *P. vivax*. Of 50 adult males examined in the same way 20 showed parasites, and of 49 adult women 17 were positive. In another camp, Kanaanga, one kilometre away from Bakwanga, no mosquitoes were found, but of 93 children below 10 years of age 61 were positive and of 72 adult women 22 were positive. At the time no men were examined as they were all away at work. Most of the parasites were *P. falciparum*, a few *P. malariae* and one *P. vivax*.

At Tshimanga all the author's time was taken up with bilharzia investiga-

of dealing with the menace are by pumping out the water and filling in the craters.

Schistosomiasis has increased much of late years. In 1932 among 3 000 workers, 80 (2.6 per cent) were in hospital with the infection. In 1945, Dr Sacré reported "22 per cent of those with stomach complaints had bilharziasis and 7.6 per cent of all coming to the dispensary for treatment. At Tshumanga 14 per cent of the workers were infected and 33 per cent of dispensary patients had hookworms. In February 1946, the author and his assistants examined 39 men, 231 women and 47 children, 317 in all, in Tshuman—
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CAWSTON F. G. Notes on Schistosomiasis from South Africa. *J Trop Med & Hyg* 1947 Aug v 50 No 8 160-61

MURRAY, A.
tina
Argent.
Summ.

A further case of bilharzial infection of the bladder is reported. The lesions were caused by *Schistosoma haematobium*. The patient had probably acquired the infection in Egypt.

"A biopsy revealed a characteristic granuloma formed round the parasite eggs."

MAKAR, N. A Preliminary Note on Bilharzial Cancer of the Bladder. *La Semaine de l'Egypte pour la Lutte contre le Cancer* 23-30 Novembre 1938 89-112 17 coloured pls & 8 figs [11 refs] [1941 Cairo Ministère de l'Hygiène Publique]

Arguments in favour of regarding bilharziasis as a frequent cause of vesical

The chief part of Dr Makar's paper is concerned with the surgical pathology and treatment of the disease and his coloured illustrations of bilharzial lesions as seen through the cystoscope are excellent. A rather striking fact in his account of the age incidence of vesical cancer in Egypt is that among 130 patients admitted with this disease to the Kasr el Ainy Hospital between January 1937 and October 1938, no fewer than 78 (60 per cent) were under forty years of age. From the surgical standpoint, the only practical kind of prophylaxis consists of repeated cystoscopic examinations, once bilharziasis has been diagnosed, so that precancerous papillomata and ulcers can be properly treated at an early stage.

Harold Burrows

SCANDAR Bey, R. Bilharzial Cancers in Alexandria. *La Semaine de l'Egypte pour la Lutte contre le Cancer* 23-30 Novembre 1938 295-300, 1 chart [1941 Cairo Ministère de l'Hygiène Publique]

ch con-
g other

Site of cancer	Number of cases	Number showing bilharzial infection
Bladder	28	21
Prostate	3	2
Colon	35	2
Cervix uteri	28	1

The cancers of the bladder and prostate in which no bilharziasis was found, almost certainly, he says, were associated with such infection because the patients had been working in occupations in which this could not have been avoided. The author says that in some parts of Egypt as many as 90.5 per cent. of the general population have bilharzial infection of the urinary tract.

Harold Burrows.

ONSY Bey, A. Rare Tumour Formations associated with Bilharzial Infections. *La Semaine de l'Egypte pour la Lutte contre le Cancer* 23-30 Novembre 1938. 17-47, 44 figs. [1941. Cairo: Ministère de l'Hygiène Publique.]

After a short account of the life-history of the schistosomes and the method by which they enter the human body, Dr. Onsy gives a thoroughly detailed account of the histological changes which are produced in tissues in which eggs have been retained. These changes are illustrated by numerous microphotographs. The great majority of the lesions occur in the pelvic organs where carcinomata and sarcomata are apt to be induced. Among the former Dr. Onsy includes cancers of the bladder, rectum, prostate, vagina, uterus and

leave very little room for doubt of the existence of a causative relation between Bilharzia infection and tumour formation."

Harold Burrows.

MAKAR, N. & FAWZY, R. M. Bilharzial Carcinoma of the Urinary Bladder—a Note on some Unusual Cases. *J. Roy. Egyptian Med. Ass.* 1947, May, v. 30, No. 5, 261-6, 6 figs. & 1 coloured pl.

Carcinoma of the bladder is stated to be the commonest form of cancer in Egyptian males, and is commonly fatal within two years. The relation of this condition to schistosomiasis has been the subject of much discussion and the author presents three unusual cases, in a schoolboy of 13, and two farmers of 42 and 40 years respectively.

In the first case, the patient had had repeated attacks of schistosomiasis. He was admitted with frequency of micturition and dysuria; a large ulcerating fungating tumour at the junction of the base and left lateral wall of the bladder was found at cystoscopy and it proved to be a squamous carcinoma with high cellular differentiation. A bilateral uretero-sigmoid anastomosis resulted in marked general improvement of the patient. This was made possible owing to the relatively sound condition of the ureters. The youth of the patient is noteworthy.

The second patient had symptoms of renal colic and frequency; cachexia and oedema of both limbs were present: schistosome ova were found in the urine. Rectal examination revealed the presence of a hard, stony mass proximal to an almost normal prostate: the mass was fixed and comprised the whole bladder base. X-ray examination of the lungs showed multiple opacities,

varying in size. This diffuse lung metastasis is a rare result - the complete absence of marked lymphatic secondaries supports the recent hypothesis that metastases of bladder carcinoma are carried mainly through the bloodstream along the paravertebral vessels. No treatment was regarded as being of value in this case.

The third patient had suffered severe suprapubic pain and persistent haematuria, he had had incomplete treatment for schistosomiasis. About two

both thighs. This indurated oedematous appearance was also seen in the skin, especially over the left groin. dark hard, slightly tender nodules were scattered throughout the area. [All these features are illustrated in a colour plate]

glands showed an undifferentiated squamous carcinoma with high mitotic figures. Spinal alcohol injections constituted the only treatment possible, two of these at a month's interval caused much alleviation of pain and discomfort.

metastases

The paper is illustrated by a colour plate, four X ray pictures and 2 photomicrographs of biopsy specimens.

of the former in a given case.]

H. J. O. D. Burke Gaffney

BARTTER, F. C., COWIE, D. B., MOST, H., NESS, A. T. & FORBUSH, S. The Fate of Radioactive Tartar Emetic administered to Human Subjects. I. Blood Concentration and Excretion following Single and Multiple Intravenous Injections. *Amer. J. Trop. Med.* 1947 May, v. 27, No. 3, 403-16, 2 graphs [19 refs.]

seven of whom received single intravenous doses of the drug ranging from 0.253 to 1.6 mgm. Sb per kilo of body weight, given over a 5- to 10 minute period, the last volunteer received a full therapeutic dose of 10.1 mgm. per kilo in 13 doses. Some of the usual toxic symptoms were experienced by the

patients. Excretion and blood concentration were measured by means of Geiger counters and scaling circuits, since the high energy gamma radiation aided detection in the presence of other organic material. In blood and urine, determinations were made mostly on dried specimens, while for faeces emulsions were used. The literature on the excretion of Sb after intravenous injection is cited. The present authors found that the blood level fell very rapidly and this probably accounts for the low efficiency of therapy by a single intravenous dose. At first there was a rapid elimination by urine and faeces, 80 per cent. being finally excreted by the former and 20 per cent. by the latter route. Experience with multiple injections suggests that it is possible to maintain a higher blood level by controlling the size and frequency of dosage.

J. D. Fulton.

PESIGAN, T. P. Results of a Brief Schistosomiasis Survey around Lake Mainit, Mindanao. *J. Philippine Med. Ass.* 1947, Jan., v. 23, No. 1, 23-32, 3 pls. (1 map). [14 refs.]

Lake Mainit is near the northern tip of the island of Mindanao, Philippines, which itself is not far from the island of Leyte, where schistosomiasis was encountered during the recent war. The author gives a full account of two series of examinations of faeces of local inhabitants, in which 6 per cent. and 21.6 per cent. respectively of infections with *Schistosoma japonicum* were found. Many of the patients were apparently in good health. The snail host, *Schistosomophora (Oncomelania) quadrasi*, was found in canals draining water from certain wells, and in rice fields. The sanitary habits of the people were poor, and other intestinal parasites were found in all faeces examined.

Charles Wilcocks.

BONNE, C., BRAS, G. & LIE KIAN JOE. *Echinostoma revolutum* (Froelich 1802). Een nieuwe echinostoom van den mensch op Java. [*Echinostoma revolutum*. A New Echinostome of Man in Java.] *Med. Maandblad. Batavia.* 1947, June, No. 11, 207-9.

Four species of echinostomes have been found in Indonesia infecting man: *Euparyphium ilocanum*, *Euparyphium malayanum*, *Euparyphium recurvatum* and *Echinostoma lindoense*. The new parasite, identified as *Echinostoma revolutum*, which is common in ducks and fowls and also in rats, was discovered in two adult Indonesians and a boy in Batavia during the Japanese occupation. Although this fluke closely resembles *Echinostoma lindoense*, also a known infection of fowls and ducks in Celebes, it differs from the latter by the greater length of its circumoral spines. The first intermediate hosts of *E. revolutum* are probably *Lymanea rubiginosa* and *Anisus convexiusculus*. Second intermediate hosts could be *Viviparus javanicus*, *Pila conica* and other snails, which if eaten improperly cooked would be the source of human infection.

W. F. Harvey.

HARANT, H., GIRAUX, J. & BRAUN-BLANQUET, Mireille. Petite épidémie familiale de teniasis à *Hymenolepis*. [A Small Outbreak of *Hymenolepis* Infection in a Family.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 3/4, 89-90.

A child of 3½ was seen by the authors in Montpellier in January 1946. She had suffered from a refractory enterocolitis in August 1945, following a 3-weeks stay in the outskirts of Marseilles. Thereafter she passed a little blood in the stools almost daily. The stools numbered 4 to 6 each day, were sometimes "like

cowdung sometimes formed and glairy in the centre. There was an eosinophilia of 10 per cent. Examination of the stools showed many eggs of *Hymenolepis nana*.

The worms were expelled by the use of oil of *Chenopodium ambrosioides* which plant was grown near Montpellier [the junior author will report later on the therapeutic action of this locally extracted oil].

It was known that the village where the child had presumably been infected had been frequented by African troops from Senegal and Madagascar and that during the summer 30 to 40 per cent of the population suffered from persistent enterocolitis. Examination of the stools of 6 members of the patient's family revealed the presence of *H. nana* eggs in 3 of the children.

H. J. O. D. Burke Gaffney

DE MEIRA M. T. V. & CORREIA A. de M. T. Parasitismo por vermes intestinais em habitantes de uma povoação rural portuguesa [Parasitism by Intestinal Worms in the Inhabitants of a Portuguese Village] *An. Inst. Med. Trop. Lisbon* 1946 Dec. v. 3: 277-91. 4 figs. [14 refs.] English summary.

The authors present the results of their investigation on the parasitic infestation by intestinal worms in the inhabitants of a Portuguese village (Quaias, Figueira da Foz).

On 151 persons observed: 74 male and 77 female between the ages of 2 and 22 years, all were infested as follows:—

10 persons by	<i>Ascaris lumbricoides</i>
5	<i>Trichocephalus dispar</i>
131	<i>Ascaris</i> and <i>Trichocephalus</i>
3	<i>Ascaris</i> , <i>Trichocephalus</i> and <i>Enterobius vermicularis</i>
2	<i>Ascaris</i> , <i>Trichocephalus</i> and <i>Hymenolepis nana</i>

The authors related this high infestation to the poor individual hygiene and point out the more convenient measures for the prevention of these helminthic infestations.

GALLIARD H. Développement des microfilariae de *Filaria malayi* chez *Aedes* (S.) *aegypti* et *Aedes* (S.) *albopictus* [Development of Microfilaria of *Wuchereria malayi* in *Aedes aegypti* and *Aedes albopictus*] *C. R. Soc. Biol.* 1947 Feb. v. 141 Nos. 3/4: 105-6.

In a previous note [this Bulletin 1939 v. 36: 156] it was established at Tonking that microfilariae of *Wuchereria bancrofti* can develop up to the infective stage in *Aedes aegypti*. In 1942 this work was confirmed but with *Aedes albopictus* no success was obtained. In 1938 the author tried without success to infect both these species with the microfilariae of *W. malayi*, but in 1942 he succeeded not only with *Aedes aegypti* but also with *Aedes albopictus*. The patient on whom the mosquitoes were fed had no filarial symptoms but 11 microfilariae were present in 10 cmm. of blood at 11.0 p.m. On the 10th day a larval filaria completely developed was found in the labium of *Aedes albopictus*.

It is claimed that this is the first record of the development of any filarial species in *Aedes albopictus* and the first record of the development of *W. malayi* in these two species of mosquito. The author asks what these results indicate. It seems at first sight that the number of mosquitoes employed is not proportional to the results. In the case of *W. bancrofti* no results were obtained with 90 specimens in one attempt and 70 in another. On the contrary in two other instances he succeeded with 30 and 10 specimens respectively.

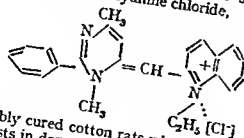
It may be argued that the percentage of mosquitoes infected may be proportional to the number of microfilariae in the peripheral blood, but this is not so, because he failed in one case with 80 microfilariae and succeeded, on another occasion, with 20-30 microfilariae per 10 cmm. of blood.

In 1938 the hypothesis was formulated which suggested that it might be a question of conditions favourable to the human carriers of microfilariae, but perhaps there might be in existence local races of parasites adaptable more or less to this or that vector. Recent researches in Samoa [BYRD *et al.*, this *Bulletin*, 1945, v. 42, 479], showed that *Aedes aegypti* was refractory there, whereas in Porto Rico [NEWTON, WRIGHT and PRATT, this *Bulletin*, 1946, v. 43, 52] in 5 per cent. of *Aedes aegypti* experimentally fed complete development was observed. These facts would seem to support the latter idea.

P. Manson-Bahr.

WELCH, A. D., PETERS, L., BUEDING, E., VALK, A., Jr. & HIGASHI, A. A New Class of Antifilarial Compounds. *Science*. 1947, May 9, 486-8.

Cotton rats infected with *Leishmanoides carinii* [see this *Bulletin*, 1945, v. 42, 136] have been used as experimental animals in a search by the authors for a non-metallic drug effective in filariasis. Screening tests were made by giving maximum tolerated doses of drugs intraperitoneally, the doses being spaced in such a way that a favourable concentration was maintained in the tissue fluids during treatment. For this purpose 18 doses of drug were given at intervals of 8 hours. Forty hours after the last injection the animals were killed and filarial worms were removed aseptically from the pleural cavities and observed in sterile medium to determine whether death had occurred. *In vitro* studies were made with those drugs which proved active *in vivo*. Some members of the group of cyanine dyes were curative under these conditions. Experimental data suggested that oxidative enzymes were inhibited by the active substances and a characteristic grouping appeared necessary for activity. These substances also proved effective when given intravenously, but other routes of administration proved less satisfactory, and intramuscular or subcutaneous dosage caused tissue damage. The most active substance was 1'ethyl-3,6-dimethyl-2-phenyl-4-pyrimido-2'-cyanine chloride,



and it almost invariably cured cotton rats when given in well-tolerated doses. In chronic toxicity tests in dogs and monkeys it was found that the drug was concentrated in the kidney, with accompanying mild damage to that organ. Recovery of excreted material indicated that the substance underwent change in the body. Treatment has now been given to 27 Porto Rican patients infected with *Wuchereria bancrofti*, in various dosages intravenously, and only mild toxic symptoms have been noted. The final results will be awaited with interest.

J. D. Fulton.

RUIZ REYES, F. Estado actual del tratamiento de la oncocercosis. [The Present Position in the Treatment of Onchocerciasis.] *Medicina*. Mexico. 1947, June 10, v. 27, No. 533, 245-50. English summary.

The author states that surgical treatment is the treatment of choice in onchocerciasis, for which there is no specific curative drug. As an auxiliary to

the restlessness diminished, and the local swelling disappeared by the fourth day. The second patient was an adult bitten on the foot by a puff adder, *Bitis arietans*. When he was seen half an hour later he was much distressed, very restless, breathing with difficulty and with pulse barely perceptible. Two cc of a 10 per cent solution of $MgSO_4$ were injected through the punctures into the bitten area. Improvement set in in less than 10 minutes, the local swelling had much subsided in 24 hours and the patient left hospital, discharged fit, next day.

The author carried out some experiments with the venoms of these two snakes, using fowls. With the *Sepedon* venom the control died in one hour and 40 minutes. The other which received the salt 10 minutes after injection of the same dose of venom and at the same place, though at first drowsy and unable to eat or drink, gradually recovered and was well 10 days later. With the *Bitis* venom 4 minims were injected into the pectoral muscle of a fowl, and this time 20 minutes were allowed to elapse before the salt was injected in the same place. The bird was incapacitated for 56 hours and then began to recover. There was none of the local sloughing usually seen in puff adder bites.

H. Harold Scott

DERMATOLOGY, AND FUNGUS DISEASES

PANJA, D., DEY, N. C. & GHOSH, L. M. Sporotrichosis of the Skin in India. (A New Species described.) *Indian Med. Gaz.* 1947, Apr., v 82 No 4, 200-202

"(a) A case of sporotrichosis of the skin in an Indian female vegetable dealer is described

"(b) Literature on this subject is very scarce in India, this is probably the second authentic case reported from this country

"(c) The species is pathogenic to common laboratory animals

"(d) Detailed mycology shows that the colour of the growth resembles the European type species *S. beurmanni* but it differs from *S. beurmanni* in its biochemical reactions, morphology and some other points

"(e) It differs from other known pathogenic species in many respects

"(f) It is proposed to name this new species *Sporotrichum* (Rhinocladium) *tropicale* n. sp."

KERVAN, P. & ARETAS, R. Deux

Français [Two Cases of Histio

Med. de l'Afrique Occidentale

[11 refs.]

the gums during the operation of cleaning the teeth with a piece of wood, as is the native custom. As the tumour was fluctuating it was opened and about 20 cc of yellowish pus were evacuated. In the pus, numerous yeast like organisms measuring from 10 to 15 μ in diameter and having thick capsules were found. After three weeks during which iodide treatment was pressed the patient appeared cured. Two months later, however, the abscess had reformed. It was again opened and the pus, which contained the same organism, was removed. On this occasion two injections of 1 cc of lipiodol were made into the abscess, which gave no further trouble.

The second case was in an emaciated African girl, 15 years of age, who presented herself for treatment on account of two tumours the size of oranges in the presternal region. A similar growth the size of a pea was found on the left side of the chest. In addition, there were excoriations covered with brownish crusts on the lower limbs and thorax, the lower limbs were oedematous and the abdomen distended with ascitic fluid. Examination revealed enlargement of the liver and spleen and a general adenitis. In pus extracted from the tumours and the excoriations the same yeast-like organisms as those found in the previous case were present in abundance. They were also found in liver puncture material and, after several failures, cultures were obtained from the blood on glucose agar. During the observations the child became comatose and died some hours later. At the post-mortem examination, ascites and glandular enlargement were noted. Both the liver and spleen were impregnated with yellowish nodules of various sizes, while an abscess occurred in the interior of the enlarged spleen. The inner surface of the skull showed patches of necrosis. The organisms were found in the spleen, liver, glands, bone marrow and necrotic areas of the bones of the skull. When cultivated, they developed after a few days a network of filaments with terminal spores which reproduced still further by budding. It is concluded that the organism corresponds to *Histoplasma capsulatum*, from which it differs, however, in its larger size.

C. M. Wenyon.

SANTOS ZETINA, F. Un caso de erosion interdigital blastomicetica. [A Case of Blastomycotic Interdigital Erosion.] *Rev. Méd. Yucatán*. 1947, Apr. 30, v. 24, No. 4, 67-8, 1 fig.

CATANEI, A. Du choix des animaux de laboratoire pour l'étude du pouvoir pathogène des champignons-parasites de l'homme. [The Choice of Laboratory Animals suitable for studying the Pathogenicity of Fungus Infections of Man.] *Arch. Inst. Pasteur d'Algérie*. 1947, June, v. 25, No. 2, 90-93.

The author discusses the laboratory animals most suitable for inoculation in testing the pathogenicity of fungi parasitic to man.

He describes the merits and defects of each one and the local and general effects commonly produced.

He concludes that while the guinea-pig is the most suitable animal for use in investigating the ringworm infections, the white mouse is particularly sensitive to other fungus infections; and for studying morphological characters *in vivo*, this animal is to be preferred in the case of inoculation with the organisms of actinomycosis, sporotrichosis, mycetoma and histoplasmosis.

H. J. O'D. Burke-Gaffney.

GENERAL ENTOMOLOGY.

- i. PEREIRA, M. DE C. Culicídeos da provincia do Sul do Save (África Oriental Portuguesa). [Culicines of the Province of Sul do Save, Portuguese East Africa.] *An. Inst. Med. Trop.* Lisbon. 1946, Dec., v. 3, 341-64, 24 figs. on 13 pls. English summary (9 lines).
- ii. —. Culicini (Diptera, Nematocera) da colónia de Mocambique. [Culicines of Mozambique.] *Ibid.* 365-72, 1 fig. English summary (6 lines).
- i. The author conducted a mosquito survey of the Province do Sul do Save in Portuguese East Africa during June to September 1944. In the first paper,

he gives a list of the places visited with the mosquitoes found in each. Twelve species and varieties of *Anopheles* were taken as well as more than forty culicines. Breeding places of some of the mosquitoes are illustrated by 24 photographs.

ii. The second paper is a list of the culicine species found on the above survey, together with their distribution and some notes on morphological characters where they differ from the type forms.

H. S. Leeson

SENEVET, G. Le genre *Culex* en Afrique du Nord. I. Les larves. [The Genus *Culex* in North Africa. I. The Larvae.] *Arch Inst Pasteur d'Algérie*. 1947, June v 23 No 2 107-36 4 pls [35 refs]

COLAÇO, A T F. Study Trip to the Union of South Africa. Some *Culicoides* of the Transvaal. *An Inst Med Trop* Lisbon 1946, Dec., v. 3, 235-66, 12 figs [Bibliography] [Portuguese version 217-34]

In this paper (which is in English) the author describes the females of *Culicoides babrius* and *C. hirtus* and the male of *C. milnei*; he gives a key for the identification of the Ethiopian *Culicoides* and an extensive, annotated bibliography concerning 86 species.

H. S. Leeson

PAVLOV, P. Les tiques en Bulgarie et leurs hôtes vecteurs. [Ticks and their Vectors in Bulgaria.] *Bull Soc Path Exot*, 1947 v 40, Nos 3/4 95-8

This is a list of twenty four species of ticks and their hosts as found in Bulgaria since 1935.

DELPY, L. P. Présence en Iran d'*Ornithodoros erraticus* (Lucas 1848) [Presence of *Ornithodoros erraticus* in Iran.] *Bull Soc Path Exot* 1947 v 40, Nos 3/4, 90-95, 1 text fig & 7 figs on 2 pls

This is a full description of the tick illustrated by photographs.

MCCULLOCH, R N. The Adaptation of Military Scrub Typhus Mite Control to Civilian Needs. *Med J Australia* 1947, Apr 12, v 1, No. 15, 449-52, 2 figs

The author reviews the work already done on the control of trombiculid mites or chiggers, and adds a concise account of the scrub-itch mites of Australia and experiments performed by him on ground disinfection by gammexane. Australian and American workers are particularly concerned with control of scrub-itch, but their methods [see this *Bulletin*, 1946 v 43 1034] were inspired by war-time demands for the prevention of scrub-typhus, which is now known to be very widespread and is probably becoming increasingly established. Mites causing serious inconvenience to man are described from clay soils around Sydney ("grass-itch" — *Acomatacarus australiensis* Hirst), along the S E coast ("titree-itch" — *Trombicula samboni* Womersley), and in Queensland and New Guinea ("scrub-itch" — *T. minor* Berlese and several other species), while *T. sarcina* Womersley in the Atherton highlands causes "black soil itch" and a serious crippling of sheep.

In concert with antimalarial measures chigger control is directed firstly towards personal protection by the treatment of clothing, and secondly against the mites on the surface of the soil. Personal protection by impregnating the clothes with phthalates or benzyl benzoate is generally applicable and can ensure 90 per cent. or more protection against scrub-typhus or scrub-itch. The treatment of the ground is applicable to important foci (e.g. infested gardens or

plantations) where man is frequently exposed: hitherto, this has been effected in scrub-typhus "islands" by clearing and spraying with crude oil, but the author has confirmed the remarkable efficacy of gammexane.

The standard treatment of clothing is the application of a teaspoonful of dimethyl-phthalate to a pair of socks, or an ounce to a set of socks, trousers and shirt, repeated after laundering. Dibutyl-phthalate will, however, last 3 boilings or 6 warm-water washes by hand. The author suggests applying DBP immediately before laundering to avoid the unpleasant collection of dust by the agent, and for home use recommends a shaker containing one part phthalate to 2 or 3 of water; otherwise, hand-smearing or dipping in a 5 per cent. emulsion in 2 per cent soap solution may be adopted. Benzyl benzoate, benzil and other agents are likely to replace phthalates in other theatres.

Experiments in a Sydney suburb showed that gammexane, band-dusted on the soil [short grass, presumably] at the rate of 1-1½ lb. per acre of 14 per cent. crude benzene hexachloride in dust (=about 1.9 per cent. gammexane, and 1-1½ oz. of dust per 6 sq. yds.) gave an immediate reduction of over 95 per cent. in counts of larvae of *A. australiensis* Hirst, lasting for over a fortnight. The mite populations were estimated by counts on black cloth squares stretched on wire frames which were laid flat on the ground for 2-4 minutes, a method recommended by the author for relatively small populations.

[The effect on the nymphs and adults of the mites is most important and has not yet been studied. The author considers that two or three applications suffice to suppress *A. australiensis* throughout a season, but the number of applications necessary will depend upon the life-cycle and habits of the mite, the effect on the adults, and the local conditions of application to the soil, so that proper methods will vary considerably with different mites and the terrain. Chiggers are generally most active in conditions of shade and raised humidity, and this has practical applications.]

J. R. Audy.

LABORATORY PROCEDURES.

BAHRAMI, A. Un colorant de remplacement du Giemsa. [A Substitute for Giemsa Stain.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 3/4, 110-11.

When Giemsa stain was unobtainable, the author obtained good results with a "mercurial blue" and eosin.

To prepare the reagent, 1 gm. of $HgCl_2$ is dissolved in 150 cc. of distilled water: to the solution is added a sufficient quantity of 10 per cent. sodium hydroxide to obtain a precipitate of yellow oxide of mercury. This is removed and washed with several changes of distilled water until the fluid coming away is neutral to litmus paper. To the oxide of mercury 110 cc. of a 1 per cent. aqueous solution of methylene blue is added and the whole is kept in an autoclave at 120° for one hour. The liquid thus obtained is of a violet-blue colour: if it is too violet it should be rejected. The liquid is finally filtered and dried in a water bath.

To prepare the stain itself, 1 gm. of the powder and 0.5 gm. of eosin are dissolved in a mixture of 50 cc. of absolute methyl alcohol and 50 cc. of neutral glycerin. The mixture may be used after 24 hours. The stain is used in the same manner as Giemsa.

H. J. O'D. Burke.

CASTELLANI A. The "Carbolic Acid Test" for the Detection of Quinine in the Urine. *An Inst Med Trop* Lisbon 1946 Dec 3 377-80 [Portuguese version 373-6]

In this alternative to Tanret's test 1.5 cc of liquid carbolic acid is pipetted

Another technique is to add 2 to 3 cc of a 10 per cent aqueous solution of carbolic acid to 5-8 cc of urine on shaking thoroughly turbidity develops if quinine is present. As in the case of Tanret's test, a positive result also occurs if albumin is present by the fact that in the

positive results appeared about two hours after quinine was taken and persisted for at least ten hours.

It is suggested that this test is simpler than Tanret's since liquid carbolic acid is readily available in every hospital. *H J O D Burke-Gaffney*

REPORTS SURVEYS AND MISCELLANEOUS PAPERS

COOK ISLANDS NEW ZEALAND. Report of the Administration of the Government of the Cook Islands, including Niue, for the Year ended 31st March, 1947 [FRASER P] 23 pp

In 1946 the South Pacific Board of Health was established with headquarters Suva, Fiji, and the Cook Islands were brought within its scope. The staff of the medical department of the Cook Islands includes 2 European medical officers and 7 Native medical practitioners.

In the year under review general health was good. Outbreaks of poliomyelitis in Rarotonga, cerebrospinal fever in Atiu, and trachoma in other islands which were mentioned the previous year died down early in the year. Influenza became epidemic and there was an outbreak of Bornholm disease (epidemic pleurodynia). Tuberculosis continues to be the main medical problem and a new sanatorium is in full operation. Filariasis is prevalent on some islands.

The island of Niue is rather separate from the rest; it is a coral atoll of 100 square miles without natural fresh water. Its considerable population is served by one European medical officer and one Native medical practitioner.

8 deaths in just over 3 weeks

Charles Wilcocks

AFRIQUE OCCIDENTALE FRANÇAISE. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1945 [DURIEUX, C.J.]. [Technical Report of the Pasteur Institute in French West Africa for 1945.] 84 pp. 1947. Dakar: Grande Imprimerie Africaine.

This report contains a full and informative account of the Pasteur Institute in Dakar and its related services. Details are given of routine examinations made, together with notes on items of special interest. For example, it is noted that *S. haematobium* eggs were found 293 times (once in a European) in the course of clinical examinations of the urine: in addition, a systematic examination of garrison troops in Dakar, already made in 1943, was repeated in 1945. *S. haematobium* eggs were found in 19 per cent. of 1,316 cases. The use of Pentamidine M & B. in the treatment of schistosomiasis was studied in 15 Senegal troops: the average dose was 3 mgm./kgm. of body weight, in 1/20 or 1/30 solution in distilled water. The intramuscular route was employed, as undesirable reactions occurred in two cases where the drug was given intravenously. A total of 10 to 15 injections were given, the drug being injected once daily or on alternate days, and were well tolerated. Initial results were promising, but the apparent success was not maintained. Nevertheless, it is suggested that the results were sufficiently encouraging to merit further trials with another diamidine or the same one in larger doses or a different schedule. Full details are given of histo-pathological examinations and comment is made on the predominance of carcinoma of the liver and epithelioma of the skin. Early diagnosis and treatment will be encouraged by the Cancer Treatment Centre now being established at Dakar.

The anti-rabies service produced a phenolized vaccine prepared by the Fermi method. In 1945, there were 35 treatments given by the Institute at Dakar, of which 11 were for Europeans: 24 courses were completed, with no deaths or untoward sequelae. An additional 290 courses were reported as having been given in the other 7 colonies in 1944, with one death, but no paralytic accidents. Information has since been received that 181 treatments were given in the French Sudan in 1944, with two deaths and with one death in an untreated person. Details are given of these treatments and the clinical features.

No change was made in the method of preparing yellow fever vaccine in Dakar: some 4½ million doses were issued in 1945. Despite difficulties in procuring and maintaining white mice, 1,058 protection tests were made, 1,040 of them with human serum. Of these, 617 were in connexion with comparative studies of the efficacy of the Dakar vaccine [this *Bulletin*, 1946, v. 43, 1135]. 116 were concerned with the control of vaccination, 305 in the course of field studies and two in the diagnosis of yellow fever. The control of yellow fever vaccination by protection tests is discussed in relation to Dakar vaccine, used hypodermically and by scarification, and to vaccine obtained from other sources, such as 17 D and the Paris Pasteur Institute product. Epidemiological investigations included the examination of 250 blood specimens from the Gambia, of which 56.4 per cent. from four villages gave positive protection tests. Only one case of yellow fever was diagnosed in the Dakar Institute in 1945. This occurred in an unvaccinated European and diagnosis was confirmed by histo-pathological examination at autopsy.

A batch of 33 *Cynoecephalus* monkeys captured in forest land in the Gambia showed 90 per cent. to be immune to yellow fever. Although no case of yellow fever had been reported in the Gambia for 7 years this finding, together with the high degree of human immunity reported above, indicated that there is recent evidence of the existence of the virus in that Colony. The significance of the nature of the immunity encountered in the different West African dependencies is discussed fully. Finally, this informative Report gives a full account

of 1945 experiments in the comparative evaluation of Dakar Yellow Fever vaccine referred to above
H J O D Burke Gaffney

CONGO BELGE Rapports sur l'Hygiène Publique au Congo Belge pendant les années 1940 à 1944 (condensés par le Service de l'Hygiène du Ministère des Colonies d'après les Rapports du Dr VAN HOOFF Médecin en Chef de la Colonie) [Belgian Congo Reports on the Public Health during 1940-1944] 98 mimeographed pp

This report of the Public Health in the Belgian Congo during the war years 1940-1944 embodies the annual reports of those years under one cover. It contains the vast amount of valuable factual information which one is accustomed to expect from the pen of Dr VAN HOOFF.

The report is largely statistical with descriptive notes of some of the more prominent features but its closely filled foolscap pages of tables do not lend themselves readily to abstraction.

The first part of the report deals with general administration and infectious diseases and accounts of such organizations.

and medical missionary bodies. Rural dispensaries and child welfare are described and the various forms of medical instruction indicated. The report concludes with an account of hospitals, dispensaries, laboratories and hygienic measures including industrial hygiene.

To those requiring detailed statistical information of medical administration and activities in the Belgian Congo during that period this report will prove invaluable.
H J O D Burke Gaffney

GEAR J H S The Geographical Distribution and Incidence of Disease in Southern Africa. *Proc Transvaal Mine Med Officers Ass* 1917 Feb v 26 No 290 111 19 {26 refs}

with the actual diseases in this region. In spite of heavy rat infestation of the gold mines leptospirosis has not been reported although in so-home typhus and tick borne relapsing fever are common. Insect protection tests have

recognized

and the author renews an old plea for the diseases and the means of prevention contributions to the welfare of mankind.
Charles Wilcocks

BOLIVIA MINISTERIO DE TRABAJO SALUBRIDAD Y PREVISION SOCIAL Servicio Especial de Profilaxia (Fun 1946 [The Prophylactic Service of Cochabamba Annual Report for 1947] Cochabamba

[This excellent report of good work done is worthy of a better and more lasting set up. A mimeographed record is liable to be pigeon holed or set

aside and forgotten.] The main matters of interest dealt with in this report are: i. Yellow Fever; ii. Malaria; iii. Ankylostomiasis, and iv. The work of Health Units.

Yellow Fever.—At the end of 1945 and in the first two months of 1946 yellow fever broke out on the borders of Brazil and Bolivia, at Ascensión in the Canton of Petas, and invaded the provinces of Velasco and Cbiquitos. The vector was not identified, but it is said that *Aedes* does not exist and has not existed there. Altogether some 200 cases occurred and there were about 50 deaths. A team of workers was immediately despatched thither and a large part of the population was vaccinated. The last case diagnosed at the laboratory died on February 23th. Ten years had elapsed since this area had been visited by an outbreak of such dimensions.

Apart from this particular outbreak 16,055 were vaccinated in 86 localities in the Departments of Santa Cruz, La Paz and Tarija; many were re-vaccinated in zones where the infection was known to persist. Sixty-nine viscerotomy posts have been in action during the year and 491 specimens received; 19 of them were reported as positive. In an appendix, among other details are presented spot maps showing where outbreaks occurred during the year, where mosquito control was taken in hand, and tables noting the number of houses visited and the *Aedes* index of each, the viscerotomy posts and the numbers of specimens sent from each of them in each quarter of the year.

Malaria.—Increase in endemicity was recorded in various parts of the country. At Aquile, near Mizque, there was an acute outbreak in which 80 per cent. of the inhabitants are said to have been attacked. Control followed the usual lines—canalization of streams, drainage, filling, the use of Paris green, of DDT, of petroleum, of larvivorous fish, etc. The chief vector is *A. pseudopunctipennis*, at times the only one found in the Valley of Cochabamba. Here the splenic index, which in 1943 among the schoolchildren was 14 per cent., was, in 1946, down to 1.3 per cent. and the parasite index fell from 2.5 to 0.1 per cent. In Misque the splenic index was 92 per cent. in 1942 and the parasite index 73; in the year under review these figures were 67 and 14 respectively. An addendum to this section gives the spleen and parasite indices of two dozen localities in different areas for each of the four years 1943–46.

Ankylostomiasis.—During the first half of the year, work was continued in the Trinidad area and later in San Ignacio de Moxos, Santa Cruz and Santa Ana. In the first-named, of 2,288 persons whose faeces were examined 1,840 (80.4 per cent.) were harbouring bookworm, 1,371 (59.5) showed ova of *Trichuris*, and 1,261 (55.1) those of *Ascaris*. 1,135 were treated, 832 with tetrachlorethylene and 303 with bexylresorcinol; nothing is said of the results obtained.

Health Units, two in number, in north and south Yungas La Paz, with bases at Coroico and Chulumani, do much good work in the treatment of yaws, vaccination against smallpox, faecal examinations for helminthic infection, especially ankylostomiasis, and in antimalaria measures.

H. Harold Scott.

BOOK REVIEW.

COCHRANE, R. G. (M.D., Ch.B. (Glas.), F.R.C.P. (Lond.), D.T.M. & H. (Eng.), etc.] *A Practical Textbook of Leprosy.* With a Foreword by George R. McROBERTS, C.I.E., M.D., F.R.C.P., etc. pp. vi+283, 1 coloured pl., 174 figs., 6 diagrams, 2 maps, 1 chart & 1 plan. 1947. Geoffrey Cumberlege, Oxford University Press. London, New York & Toronto [42s.]

In his preface the author states that 'It has been felt for a considerable time that a practical textbook on leprosy would fill a gap between the type of book which deals largely with the theoretical aspects of the subject and the smaller pamphlets.' This is too modest a description of the present work, for it contains rather more pages of a much larger size, than the third edition of "Leprosy" by ROGERS and MUIR, and consequently the text is actually half as long again as the earlier and more comprehensive work, but includes more illustrations. Moreover, the clinical and treatment sections of the earlier work by MUIR are of an eminently practical nature, while the present work includes much stimulating theorizing, all of which will not be accepted by other leprologists.

The history of leprosy is dismissed in two pages and the aetiology in four. Epidemiology occupies thirteen pages and is in accordance with modern views except that state of civilization, climatic factors and predisposing causes are regarded as more subsidiary factors than others think. Age, contact with

are rightly emphasized as main factors. Mongolians are thought to be more

A short chapter on pathology brings importance of WADE's opinion that the resistance, with correspondingly good y microphotographs by the author.

Diagnostic and serological tests are next dealt with and only the prognostic value of the lepromin is regarded as of importance. The Rubino test is not referred to and the author agrees with those who hold that lepromatous leprosy c.

Having his work

are well described and illustrated by numerous photographs, which are good except for a few on diffuse lepromatous lesions which are difficult to interpret clearly. The Cairo classification is adopted, although it is recognized as requiring some amplification. Special attention is paid to the recognition of the earliest symptoms and this is one of the best parts of the work. The importance of differentiating between nerve cases of the tuberculoid form and the lepromatous types respectively is emphasized. Classification and the technique of examination are dealt with in a special chapter, and another is devoted to atypical lesions. The author regards these as rare and of an intermediate degree between the tuberculoid and lepromatous cases, but with a tendency to recover if the lepromin test is not negative. Pre-lepromatous maculae or incipient lesions of childhood are also described. Differential diagnosis from other diseases of the skin, including dermal leishmaniasis is well described and illustrated.

A chapter on reaction in leprosy is full and its different degrees are described. Interesting special chapters are devoted to lesions of the ear, nose, mouth and throat and of the eyes respectively, in which once more the author's great clinical experience enhances their value.

The next seven chapters, on treatment, cover 66 pages and constitute a valuable part of the work. In the opening chapter, some earlier methods of treatment are rightly dismissed briefly, and the great danger of inducing harmful reactions with iodides is emphasized. Sera, vaccines, aniline dyes and diphtheria formol toxoid are regarded as useless, and sulphonamides are only of local use in septic ulcers. Recent important work on the sulphones, such as promin and diasone is discussed, but their use is not advised until after further experimental trials: but it must be remembered that there is much delay in publication of a book at the present time. On the other hand, the modern method of injecting suitable preparations of chaulmoogra oils is relied on, although these preparations are not regarded as specific. The intradermal use of ethyl esters is preferred, and creosoted whole hydnocarpus oil advised for subcutaneous injections: details regarding their use are given. The treatment of different types of lesions is dealt with and also that of the all-important children. The control of reactions in leprosy is detailed and prescriptions are given. Special chapters are devoted to treatment of nerve, nose, throat and eye lesions, including operative measures which may be required. Another valuable chapter is devoted to the treatment of trophic ulcers, including operative measures, and one deals with complicating syphilis. Criteria of fitness for discharge, after-care and prognosis complete these sections.

The remaining 47 pages are devoted to the prevention and control of leprosy, based essentially on the author's long experience in Madras, where he has done much to forward their use. Unfortunately, in advocating the methods he has found to be of most use in Madras he has minimized the work of some of his

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the Manila Conference of 1931. Actually, its value was fully demonstrated in South Africa when Dr. Mitchell in 1923, on the basis of the reviewer's earlier writings on the subject, released one-third of the segregated patients after bacteriological examinations had proved them to be harmless, with resulting complete revolution of the old method of segregation and very favourable results, which are shown in a diagram in "Leprosy" (ROGERS and MUIR). Again, on page 193 he states that the British Empire Leprosy Relief Association was founded (1924) at a time when "it was thought that leprosy could be eradicated by treatment alone." In writing abstracts of leprosy papers for the last 25 years, the reviewer cannot recall any authority advocating treatment alone, for at a Leprosy Conference early in 1920 in Calcutta the reviewer, when advocating dispensaries for the treatment of early uninfected cases, also advocated as an essential complementary measure the founding in every province of India of agricultural colonies for the segregation of all highly infective nodular (now called lepromatous) cases. Unfortunately lack of funds prevented that measure being adopted, except partially in comparatively rich Madras. Further, a medical memorandum by the reviewer which formed the basis of B.E.L.R.A. policy, strongly emphasized the same view. MUIR's "Propaganda, Treatment and Survey Method" which has been of immense value in disclosing the incidence of, and stimulating interest in, leprosy, is also lightly dismissed. However, the preventive sections of this work are worthy of close study, they emphasize the importance of child leprosy and village isolation of infective cases (advocated earlier by MUIR). This is of importance, because the segregation of any appreciable number of infective cases may be ruled out in India for lack of the huge funds required for that

Appendices deal with public health legislation detailed descriptions of three sample surveys and diagrams for recording the distribution and treatment of leprosy. The bibliography contains over 120 references.

The scope of this work can be gathered from the above description. Its main value lies in its clinical and treatment sections. The fact that it appears under the auspices of the Oxford Medical Publications ensures it being well produced but at a cost that makes it by far the most expensive British modern work on leprosy. Dr Cochrane has done leprologists a service by recording in a convenient form the results of his long research and clinical experience of this difficult disease.

Leonard Rogers

It is with deep regret that we record the death on November 4th of Dr W H KAUNZIE C M G F R C P
 Chief Medical Adviser to the Secretary of State for the
 Colonies and Chairman of the Honorary Managing
 Committee of the Bureau from 1945 to the date of his
 death

TROPICAL DISEASES BULLETIN.

Vol. 44.]

1947.

[No. 12.]

RABIES.

SORIANO LLERAS, A. Rabia en Colombia. [Rabies in Colombia.] *Repertorio Med. y Cirug.* Bogotá. 1947, July, v. 2, No. 5, 387-402.

The author sketches the history of rabies in Colombia from the early years of the nineteenth century when, in 1810, owing to the frequent occurrence of the disease, an Order was promulgated that all dogs in the Department of Antioquia were to be hanged, except those employed in the fields, which were to be kept tied up. This does not seem to have been obeyed, for another Order in 1813 gave the police right of entry to houses to look for dogs and the owners of any such dogs discovered were fined; if the dog was rabid, the owner had to pay damages for anyone injured and was liable to 3 years' imprisonment, or hard labour, or 5 years' transportation. Nearly a century later, in 1907-8, rabies was observed in dogs, foxes, cows and horses, and it was the custom of the people to bury alive, leaving the head above ground, any animal showing symptoms and the doctor had difficulty in preventing the relatives of a human patient adopting the same method in a case where symptoms appeared four months after the bite. Several records are quoted of subsequent years up to 1940, and for the six years 1940-45 more details are given in the form of protocols. The "numbers of treatments increased, the figures being 4,630, 5,730,

All patients are given a card on which are stated the site bitten, the characters of the wound and the results of treatment; this card is supposed to be returned two months after treatment is stopped, but less than 25 per cent. have been returned. The numbers of fatal cases during the same six years were: 25, 26, 29, 17, 20 and 12. Pasteur's form of treatment was used at first, but since 1929 Semple's method has been adopted. The author ends with these words: "The summary made in the present article shows that of 125 human cases [fatal cases] 54 had received the complete course, 71 had had no treatment at all or only a very few injections. Of those who died in spite of full treatment some did not start till many days after infliction of the bite." [There is nothing to show how the figure 125 is arrived at. Those given for the period 1940-45 total 129; if we exclude 25 dying in 1940 of whom, it is stated, there is no record of how many received treatment and how many did not, the total, as shown in the tables, is 104.]

H. Harold Scott.

tolerances of *A. funestus*, or most of the year, whereas the temperature to four or five by the lessening of the severity of malaria. Both of these species become rare at altitudes of over 1,000 feet, at about which level malaria in consequence disappears.

Other factors affecting the incidence and seasonal distribution of malaria include rainfall, which operates both by extension of breeding places and by flushing of watercourses to give a variable effect; humidity, which is adequate for prolonged anopheline survival in the wetter lowlands, but rarely optimal in the drier north; and geological conditions which favour or impede the formation of breeding places. Throughout most of the island the soil is very porous and casual water persists for short periods only. In some areas of newer lava flow, however, seepages and springs are abundant, and there are a number of well-defined areas of impervious grey alluvial soil that call for special drainage measures.

A number of experiments on the ecology of *A. gambiae* and *A. funestus* are recorded, they concern chiefly the tolerance of larvae to different hydrogen ion concentrations, to salinity, to light, and to temperature. *A. gambiae* has a very marked tolerance to salinity. Extreme instances include development in waters with salt contents above that of sea water and breeding is common in coastal swamps with sodium chloride contents varying from 0.1 to 23 grammes per litre, a range covered by marshes supporting a growth of *Typha gravanica*, *Acrostichum aureum*, and *Paspalum vaginatum*, but usually exceeded by pure stands of mangrove except on their proximal edges where they are diluted by seepages or storm water channels. *A. funestus* has a much lower tolerance and is rare where the chloride content exceeds 2.0 grammes per litre.

The temperature of breeding places and the pace of larval development are related to each other and there is little doubt from the rapid larval development

such as 30°C, 25° and 20°C

showing the relationship and draw a curve, or two mathematical formulae

of catenary, the form adopted by a chain suspended at both ends, but felt impelled to supply from his own knowledge the term extrapolation together with a warning against its dangers.] The apparent effect of shade in reducing breeding of *A. funestus* is almost certainly due to the lower temperatures rather than to critical temperatures.

Melanism was found in the coastal belt, but no relationship to give typical *gambiae* variety *melas* in specimens sent elsewhere for identification. G. Macdonald.

RAO, V. V. & PHILIP, M. I. The Relationship between the Breeding of *A. fluviatilis* and Distance from Human Dwellings. *Indian J. Malariology*. 1947, Mar., v. 1, No. 1, 37-41.

"(1) *A. fluviatilis*, *A. minimus* and *A. varuna* breed in significant numbers up to at least half a mile from the place where they feed, and this distance is presumably their usual flight range in search of food.

"(2) Anti-larval operations against these species cannot safely be limited to less than half a mile in these areas."

RACHOU, R G & FERREIRA, M O Algumas observações sobre o índice larvário de anofelinos do sub-genero *Kerteszia* em bromeliáceas e sua densidade larvária no sul do Brasil. [Observations on the Larval Index and Larval Density of Anophelines of the Subgenus *Kerteszia* in Bromeliads in the South of Brazil.] *Folha Med* 1946, Oct 25, v 27, No 20, 9 pp English summary

These observations were made in 24 localities in the State of Santa Catarina and 6 localities in the State of Rio Grande do Sul in which anophelines of the subgenus *Kerteszia* breed in bromeliads. Altogether 12,538 bromeliads were examined, larvae were found in 1724. In bromeliads growing on the ground, and epiphytic bromeliads less than two metres above ground, larvae were found in 16.4 per cent — 304 larvae per 100 positive bromeliads. In epiphytic bromeliads between 2 and 5 metres above ground, larvae were found in 13.4 per cent — 290 larvae per 100 positive bromeliads. In epiphytic bromeliads more than 5 metres above ground, larvae were found in 11.7 per cent, 245 larvae per 100 positive bromeliads.

Norman White.

RACHOU, R G Da infectibilidade dos anofelinos do sub-genero *Kerteszia* pelos parasitas da malária humana. [Infectibility of Anophelines of the Subgenus *Kerteszia* with Human Malaria Parasites.] *Folha Med* 1946, Dec 5, v 27, No 23, 10 pp [19 refs] English summary (6 lines)

The author passes in review the considerable literature dealing with the capacity of anophelines of the subgenus *Kerteszia* to transmit malaria. In 1943, the National Malaria Service embarked on a programme of study of these species in southern Brazil. The author has found numerous naturally infested *A. (K.) cruzi*, *A. (K.) bellator* and (probably) *A. (K.) homunculus* in several localities in the State of Santa Catarina where they are efficient vectors of malaria.

Norman White.

SOPPIE Sophie The Pathology of Acute Falciparum Malaria. *Milit Surgeon* No 5 555-72 32 figs (6 coloured) [26 refs]

"... cases" of fatal *P. falciparum* malaria.

recent cases. workers, but there were some. For instance in the study of the brain lesions ... vessels were not obstructed by parasitized erythrocytes but ... distended by them as if during life they were part of a moving stream". In cases showing haemorrhage and 'granulomas', however, thrombi were found in the 'plugged' vessels including the central arteriole of the "granuloma". and thrombi were occasionally observed in the cortical capillaries. The thrombi were small and often did not completely occlude the lumens of the vessels concerned. The conception of vessels filled, but not obstructed, by parasitized cells is similar to that put forward by Rigdon (1942) in order to explain the apparently reversible nature of the cerebral changes in falciparum malaria. In the kidney, pigmented casts were observed in the distal convoluted lobules in 30 cases and "hemoglobinuric nephrosis" similar to that seen in blackwater fever, was present in seven. In four of the latter cases and in five others, changes were observed in the glomeruli including "generalized ischaemia, enlargement and increased cellularity". These cases had clinical evidence of azotaemia. The author considers that the incidence of haemoglobinuric nephrosis was unexpectedly high since there were not other factors except the malaria itself by which to explain this phenomenon. She holds that glomerular

cerebral vessels: it was not found in other organs even where, as in the heart, "plugging" with parasitized cells was prominent.

The illustrations in the article are excellent and the descriptions remarkably clear.

B. G. Macgrath.

SCHNEIDER, L. A. & SHALLENBERGER, P. L. A Study of Hepatic Function in Acquired Malaria. *Amer. J. Med. Sci.* 1947, July, v. 214, No. 1, 80-83, 2 figs.

In an attempt to detect liver damage due to malaria, 250 patients suffering from pure *P. vivax* infections were subjected to various tests. These tests included estimations of bromsulphthalein retention, icteric index, hippuric acid synthesis, prothrombin time, serum total protein and albumin/globulin ratio, and the cephalin-cholesterol flocculation test. The tests were applied as soon as the patients had become afebrile under treatment with a standard course of mepacrine, which was usually within two to three days of the commencement of therapy. According to the more specific tests of liver function approximately one-third of the patients showed evidence of liver damage, while the less specific tests were positive in about two-thirds of the patients. Repetition of the tests suggested that hepatic dysfunction associated with malaria is transitory and that permanent liver damage is rare, except possibly where the liver is already diseased.

F. Murgatroyd.

HENRY, A. F. X. La recherche de l'activité plasmodiale au cours de la prémunition et du paludisme chronique. [Signs of Activity of the Malaria Parasite in Patients in a state of Premunition and in Chronic Malaria.] *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 11/12, 216-19.

In countries in which malaria is endemic, the state of premunition which many of their inhabitants enjoy may weaken in certain conditions. A superadded morbid condition may then reawaken malaria activity, though the parasites may not be discoverable in blood smears. The author details the clinical signs and laboratory tests on which he relies to evaluate the rôle of malaria in the causation of the patient's condition.

Melano-flocculation may lead one to suspect the persistence of a malaria infection. Quantitative and qualitative Takata Ara reaction is of great value in at least three tubes including the fifth tube, 1/32 dilution. Flocculation in only two tubes is an indication for a repetition of the test. Determination of bilirubin in the blood should not be forgotten. Blood urea may be increased, but it is often below normal. Notably diminished. A low blood urea is an important sign.

Pathological conditions are sometimes attributed to malaria without sufficient proof: it is none the less true that an unsuspected malaria infection is responsible for many failures of treatment. An interesting case of cirrhosis of the liver in an alcoholic is described. The prognosis was most unfavourable. A positive melano-flocculation test was obtained. Antimalarial treatment contributed to an unexpected recovery.

Norman White.

STUDDERT T C Subtertian Malaria in White Troops in West Africa A Review of 800 Cases *J Trop Med & Hyg* 1947 Mar v 50 No 3 44-52 2 charts [15 refs]

LAMBILLON J Lésions érysipéleuses d'origine malarienne [Erysipeloid Lesions of Malarial Origin] *Ann Soc Belge de Med Trop* 1947 Mar 31 v 27 No 1 91-3

The author records 7 cases four of which are described in detail in which lesions resembling erysipelas were associated with malaria. In most of the cases the lesion was a red patch showing characters apparently typical of erysipelas the temperature was high but the absence of a significant leucocytosis was perplexing. It was not indeed until the first two cases had been studied that the author was able to identify the condition at an early stage in the other five. All the lesions occurred on the lower limbs. In the first two cases the diagnosis of erysipelas was considered but malaria parasites were found in the blood. The patients were treated with mepacrine and Prontosil and the acute condition cleared in a few days leaving a slowly regressing ecchymosis.

no parasites were present in the blood and the case was evidently one of genuine recurring erysipelas which on one occasion had shown an identical lesion during an attack of malaria.

The last case occurred in a patient who had an attack of malaria with slightly raised temperature (he had been taking quinine regularly) and the

local capillary resistance in those areas where the circulation is relatively limited.

H J O D Burke-Gaffney

BUTLER F A & SAFERO J J Pacific Vivax Malaria in the American Negro *Amer J Trop Med* 1947 Mar v 21 No 2 111-15 1 fig

In 1942-43 a United States force composed of 72 per cent white and 28 per cent Negro troops were on a malarious island in the South Pacific. The Negroes were mostly from the C. I. to 35 years.

inevitably,

Negroes had a greater tolerance to the strain of *P. vivax* malaria encountered on that South Pacific island than had the white troops.

[This experience is in marked contrast to the numerous unsuccessful attempts to infect Negroes with Pacific strains of *P. vivax* that have been reported from the United States.]

Norman W. H. H.

BIANCO A A SAUNDERS G M LEVINE A S & COHN R Long Term Observation of *Plasmodium vivax* Malaria in the Returned Serviceman Part I *US Nav Med Bull* 1947 Mar-Apr v 47 No 2 352-67 [19 refs]

A clinical test of new antimalarial drugs necessitated the observation of a number of patients for periods of from one to nine months. Advantage

was taken of the opportunity thus afforded to study the clinical features and any unusual sequelae of malaria. The results of this study are recorded. About 1,500 attacks of malaria were observed in marines and naval men. All were due to *P. vivax*; the patients had previously been on more or less regular atebryn suppression.

In addition to the clinical picture and positive smear certain laboratory findings are consistent with a diagnosis of malaria, namely, a leucopenia with increase of mononuclear cells, increased erythrocyte sedimentation rate, and an otherwise unexplained positive Kahn reaction.

seen. Such attacks were insidious
nia or some catarrhal fever before

The diagnosis is sometimes made more difficult because of the empirical use of the sulphonamides in such conditions. Malaria cachexia and the chronically enlarged spleen were not observed in this series of cases.

The complement fixation test, with *P. gallinaceum* as antigen, was of no aid in the diagnosis of the acute attack.

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clinical attack, but tests are generally negative within four weeks, and always within ten weeks, after onset. The duration of clinical activity appears to have little influence upon the persistence of positive reactions.

Norman White.

MAROUN, T. L'action du traumatisme sur les rechutes paludéennes. Con-
(Déductions thérapeutiques.)
Medico-legal and Medico-social
ss. 1947, Feb., v. 30, No. 2,
86-98.

The author discusses the rôle of trauma in reactivating latent malaria, from the point of view of forensic medicine. He describes three cases from his experience in which criminal assault precipitated attacks of malaria. One patient died of malaria. Another committed suicide while suffering from delirium attributed to malaria. The third recovered. The question is raised as to whether the assailant should be held guilty of having caused the death of his victim in the two fatal cases, in neither case were the wounds of sufficient gravity to have caused death, had it not been for the malaria infection. The penal codes of different countries differ in this matter

Norman White.

MAKOWER, H. Observations on the Beneficial Effect of Blood Transfusions on Relapses in Benign Tertian Malaria. *Texas Reports on Biol. & Med.* 1947, v. 5, No. 2, 185-7.

Malaria became frequent in Poland during the late war, because of movements of troops and civil populations. Antimalarial drugs were difficult to obtain; only quinine was available and some patients responded poorly to it. Blood transfusions were therefore given in some cases with the aim of influencing the course of the disease.

Two such cases in soldiers are described in full. Both patients had chronic malaria, with bloody diarrhoea. Their attacks of malaria increased in severity and frequency and the patients became resistant to quinine. Anaemia of the pernicious type developed. Blood transfusions of 250 cc. of stored blood were given and repeated a few days later (in one case increased to 500 cc.: in the

other repeated and then increased to 500 cc in a third transfusion two weeks later) This resulted in rapid clinical and haematological improvement but parasites persisted in the blood In one case atebryn (mepacrine) and plasmoquine and in the other mepacrine only rendered the blood free of parasites It was evident that the beneficial effect of the blood transfusions brought about a stimulation of the defence mechanisms but the disease was transformed from a manifest to a latent one requiring specific drug therapy

The author was unable to determine whether the cases were really quinine-resistant or whether the quinine was not absorbed properly by an intestine damaged by a prolonged diarrhoea

H J O D Burke Gaffney

WISELOGLE, Frederick V A Survey of Antimalarial Drugs 1941-1945

This book is reviewed on p 1106

HAGGIS Fundamental Errors in the Early History of Cinchona *Bull History of Med* 1941 Oct & Nov v 10 Nos 3 & 4 417-59 568-92 11 figs & 1 map [Refs in footnotes]

BARANGER P Revue generale de la question des totaquinins [A Review of Totaquina] *Reu Paludisme et Med Trop* 1947 July-Aug-Sept v 5 Nos 38-39-40 201-12

TRAGER W BANG F B & HAIRSTON V G The Effect of Four Different Therapies on the Relapse Rate of Vivax Malaria *Amer J Hyg* 1947 Jan v 45 No 1 43-57 4 figs

These observations were made in a reconditioning camp established by the U.S. Army in a non malarious part of Australia to which men who had acquired malaria in New Guinea were sent A comparison was made of the relapse rates after four different methods of treating the clinical attack of *P. vivax* malaria The treatments were (1) Atebryn 1.2 gm during the first 24 hours 0.8 gm during the second 24 hours and 0.4 gm daily for the next four days total 3.2 gm in 6 days (2) Treatment as (1) followed by plasmoquine hydrochloride 0.02 or 0.03 gm a day for five days A suppressive dose of atebryn 0.1 gm was also given during these five days atebryn after one meal plasmoquine after the other two meals (3) Treatment as (1) followed by sulphamerazine 3 or 4 gm a day for five days given 0.1 gm a day during the five d first three days then 2 gm a day for (2) and (3) suppressive atebryn 0.1 gm each day except Sundays was continued for at least three usually four to six weeks After treatment (4) quinine 0.6 gm a day was given for at least three weeks

With treatments (1) (2) and (3) no relapse occurred during suppressive treatment the peak incidence of relapses was 4 to 5 weeks after discontinuance of suppression This time interval was not influenced either by the maximum atebryn plasma level observed during treatment or the length of the period of

group

some relapses occurred while the

period of 4 to 7 weeks or longer after suppression were atebryn 76 per cent atebryn plasmoquine 61 per cent atebryn sulphamerazine 69 per cent quinine 82 per cent The differences in the relapse rates following the three atebryn treatments were not statistically significant

Norman White

BUTLER, RUTH, DAVEY, D. G. & SPINKS, A. A Preliminary Report of the Toxicity and the Associated Blood Concentrations of Paludrine in Laboratory Animals. *Brit. J. Pharmacol.* 1947, Sept., v. 2, No. 3, 181-8, 3 figs.

In these experiments, paludrine was used as the monoacetate and monohydrochloride, the former for intraperitoneal and intravenous and the latter, which is less soluble, for oral tests. Both salts are stable in boiling aqueous solution. The largest dose which allowed all animals to survive (LD0) was determined as well as LD 50 and LD 100. In rats and mice, but not in chicks, death was delayed after administration by the first two routes. A second intravenous dose some hours after the first produced an additive toxic effect in the mammals. Estimation of the concentration of drug present showed that the delayed deaths in rats and mice were not due to its retention in the blood, and it is possible that in their case a more toxic substance is formed from paludrine as the result of metabolic processes. In chronic toxicity tests, blood concentrations were estimated and the effect of different dosages on the growth curves determined. No significant pathological lesions were found and the central nervous system appeared to be unaffected. The blood reached the brain most readily in the case of chicks. Comparison of blood concentrations in man and rats showed that a particular level in the latter was associated with greater toxicity than in the former, in whom the drug level was better maintained. In chicks, which tolerate a great concentration of drug in the body, the blood level of paludrine associated with lethal effects was about 10 times that in rats and mice. The distribution of the drug did not account for differences in toxicity. The behaviour of paludrine in man, to whom it is but little toxic, resembles more closely that in the chick than it does that in the rat or mouse.

J. D. Fulton.

PATINO CAMARGO, L., CORTÉS, E., GARCÍA, V., SANTOS, J., ZOZAYA, C., RUEDA V. & ROSA DEL VALLE, Julia. Información sobre la droga W7618, Difosfato 7-Cloro-4 (4-dietilamino-1-metilbutilamino) quinolina, en el tratamiento del paludismo. [Information concerning the Drug W7618, Diphosphate 7-Chloro-4 (4-diethylamino-1-methylbutylamino) Quinoline, in the Treatment of Malaria.] *Rev. Facul. de Med. Bogota.* 1946, Oct., v. 15, No. 4, 261-3.

The authors treated sixteen patients, suffering from malaria, with compound W7618 (Winthrop, New York). Eleven were chronic relapsing cases and five had primary acute attacks. Five had *P. vivax*, six had *P. falciparum* and five had mixed infections. The results were satisfactory. The drug is effective and easy to handle; the treatment is short, 3 days; no toxic phenomena of any consequence were noted, there was no discolouration of the skin.

Norman White.

CHAPMAN, N. B., GIBSON, G. M. & MANN, F. G. Synthetic Antimalarials. Part XVI. 4-Dialkylaminoalkylaminoquinazolines. Variation of Substituents in the 6- and 7-Positions. *J. Chem. Soc.* 1947, July, 890-99.

CURD, F. H. S., RAISON, C. G. & ROSE, F. L. Part XVII. Some Arylaminoaminoalkylaminoquinoline Derivatives. *Ibid.* 899-909.

MANN, F. G. & PORTER, J. W. G. Part XVIII. 3-Dialkylaminoalkylaminodiphenylamines. *Ibid.* 910-14.

MANN, F. G., NAYLOR, F. T. & PORTER, J. W. G. Part XIX. Dialkylaminoalkylaminodiphenylguanidines. *Ibid.* 914-17.

KENEFORD, J. R. & SIMPSON, J. C. E. Part XX. Cinnolines. Part XIII. Synthesis and Antimalarial Action of 4-Aminoalkylaminocinnolines. *Ibid.* 917-20.

Standard mud blocks, 2 in. square by 1 in. deep were made from sun-dried soil passed through a 40-mesh sieve. The blocks were dried slowly in wooden frames at room temperature.

Five per cent. DDT (p,p') was applied to 5×4 blocks with a Four Oaks "Kent" sprayer in dosages from 100 to 400 mgm. per square foot; toxicity tests were carried out 24 hours later on *Glossina palpalis* and *Aedes aegypti*. The outer layer of each set of four blocks was then scraped off and made up to 1 gm. in weight (representing a layer of about 0.1 mm. thick). The deposit of insecticide in this layer and in the whole blocks was determined chemically. This outer layer contains more than all the contact available insecticide. There was considerable absorption of oil solutions by the mud and only 6 to 15 per cent. of the insecticide appeared in the outer layer: mortality of the test insects was low, even with dosages of 1,000 mgm. per square foot.

The highest proportion of insecticide recovered from the outer layer (62 per cent.) was from blocks treated with a water suspension of dispersible powder the suspended particles being filtered off at the surface. There was 100 per cent. mortality of *G. palpalis* after 15 sec. contact and up to 90 per cent. mortality of *A. aegypti* after half an hour.

Comparative results of different formulations are given in a table, which indicates the superiority of the dispersible powder. Initially promising results with a "Gammexane" dispersible powder 530 were not maintained when the percentage of insecticide was determined 10 days later. Detailed results of these tests and of field trials now in operation will be published.

H. J. O'D. Burke-Gaffney.

MORGAN, R. E., SHEPPARD, R. R. & BARNETT, G. S. Malaria Control. Description of a Compressed Air Sprayer. U.S. Nav. Med. Bull. 1947, May-June, v. 47, No. 3, 529-35, 4 figs.

In order to treat vegetation (for adult anophelines) and pools (for larvae) in jungle areas, a large insecticide sprayer mounted on a lorry is used. A $1\frac{1}{2}$ ton truck carries an air compressor producing 210 cu. ft. of air per minute. This is used to atomize a 5 per cent. solution of DDT in Diesel oil from ten horizontal nozzles mounted behind the lorry. The output moving at 4 m.p.h. gives 0.1 lb. of DDT per acre. The mist produced consists of rather large droplets of various sizes (7 to 1,300 microns diameter, averaging about 100-500). Larvae in breeding sites up to 500 ft. from the point of emission were killed in 2 hours and at $\frac{1}{2}$ mile they were killed in 48 hours.

J. R. Bustine.

HEATH, R. F. Sanitation. An Experiment in Mosquito Control by Air-borne Sprays. Canadian J. Pub. Health. 1947, Aug., v. 38, No. 8, 405-7.

WILSON, D. Bagster & ROBERTSON, A. G. DDT Airspray in Malaria Control in East Africa. Trans. Roy. Soc. Trop. Med. & Hyg. 1947, July, v. 40, No. 6, 823-50, 10 figs.

Airspraying makes the control of otherwise inaccessible mosquito breeding places possible, although, at the present price of DDT, it is not an economic alternative to larvicidal ground control when that is possible and equally effective. Ground control may be impossible either because there is some impassable barrier, usually water, or because of the great extent of the breeding area to be covered. Of the two causes, the extent of breeding areas is more

likely to lead to economic applications of aerosprays for under most circumstances it should prove cheaper and more efficient than the institution of large capital works. The value of aerospray in wartime has been proved and it should prove of similar value in controlling an epidemic of malaria. The possible economic disadvantages of the widespread distribution of DDT remain to be explored but the authors show that a single spraying at a dosage of 32 mgm per square metre had no effect on fish and only a slight effect on plankton but that seven sprayings at a similar concentration caused an undoubted mortality amongst fish and aquatic insects over a limited area. They consider however that spraying over a limited area of open lake would be unlikely to have any appreciable effect on fisheries as a whole.

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varied and was about 2 gallons per second

Owing to the fact that the Service populations were being given suppressive mepacrine the means of assessment of the effectiveness of the sprayings was entirely limited to entomological observations. These observations were made at a series of stations which were outside or within the sprayed area. At these stations all available adult mosquitoes were caught and identified at regular intervals.

Larval sampling consisted in making a set number of dips per station with ladles the larvae subsequently being counted and classified by stages and genera.

The authors summary is as follows —

1 An account is given of the use of DDT aerospray against *Anopheles gambiae* and *funestus* in East Africa.

2 The entomological assessment of the series of sprayings carried out shows that spraying at a dosage of 32 mg per sq metre of pure DDT gave an immediate reduction of *Anopheles* of 98 per cent but that a dosage of 17 mg per square metre gave results that were little better than standard ground control methods.

3 The effectiveness of these two rates of application followed closely the observed larvicidal action but there was an unexplained immediate effect on adult *Anopheles* population at the higher dosage.

4 Although this was not conclusively demonstrated it is concluded that the seasonal peak of *gambiae* breeding was effectively if not completely checked this conclusion being based on the slow rate of recovery of vector house catches and on comparison with previous years.

5 Some of the results of the use of these two localities were

6 The main applications of aerospray are as follows: (a) the control of its initial

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9 It is considered that aerospraying over the limited areas to be covered in practical malaria control is unlikely to cause any serious upset of the biological balance of other fauna.

R M Gordon

RIBBANDS, C. R. The Use of Residual Films of DDT and Gammexane in Malaria Control. *Bull. Entom. Res.* 1947, Mar., v. 37, Pt. 4, 567-92, 4 figs. [13 refs.]

This work was carried out in Assam, where malaria is carried by *Anopheles minimus*, with the object of developing an efficient and economical residual spray technique, of comparing the efficiency of different sprayers, of the two insecticides available (DDT and benzene hexachloride) and of different doses and types of application.

The sprayers tested were —(a) motor-driven air pressure sprayers of the paint gun type; (b) "MISH" (Malaria Institute of India) fit guns; (c) Sheltox fit guns; (d) Four Oaks Knapsack oil sprayers; (e) Solo sprayers; (f) Stirrup pumps; and (g) hand-operated knapsack pressure sprayers of the type pumped up before use. The first three, in which the spray is atomized by air, were all considered too wasteful for normal use. All the others could be used satisfactorily the last having fewest disadvantages. Greatest efficiency was secured when the nozzle was held at about one foot from the wall to be treated.

On theoretical grounds, the author believes that an observed 90 per cent reduction in vector anophelines almost certainly indicates complete control of malaria transmission, and a 70 per cent. reduction a very probable elimination of the disease, and his results, tabulated in detail, are illustrated on this assumption. The standard dosage employed was one quart of solution to 200 sq. ft., the quantity of insecticide applied being varied by modification of the strength of solution [one quart of 5 per cent. DDT to 200 sq. ft. is equivalent to 10 oz. DDT per 1,000 sq. ft.]

The periods for which DDT solution in kerosene gave a continuous 90 per cent. reduction in *A. minimus* were —10 per cent. solution over 20 weeks; 5 per cent. over 20 weeks, 2½ per cent., 8-12 weeks; 1½ per cent., 12 weeks; ¾ per cent., 5 weeks, ½ per cent., 1 week. DDT/oil/water emulsions gave similar control for the following periods: —10 per cent. over 20 weeks; 5 per cent., 12-15 weeks, 2½ per cent., over 20 weeks; 1½ per cent., over 20 weeks; ¾ per cent., 10 weeks, ½ per cent., 3 weeks. The emulsion was therefore considered superior to the solution, and heavy doses were thought preferable on account of their long duration of effect, to smaller ones.

Gammexane was used in the form of crude benzene hexachloride containing 12 per cent. of the gamma isomer. The duration of effect of gammexane solutions in kerosene against *A. minimus* was: —5 per cent. (0.6 per cent. gammexane) 7 weeks, ¾ per cent. (0.075 per cent. gammexane) 4 weeks; ½ per cent. (0.0375 per cent. gammexane) 2 weeks. A 5 per cent. (0.6 per cent. gammexane) oil/water emulsion was effective for 10 weeks. All these trials were on a smaller scale than those with DDT.

In these trials, the author treated the complete inner surface of the houses. He also tried fractional treatment of the walls, applying 5 per cent. DDT solutions to the outside walls, the ceilings, inner walls, the lower half and the lower quarter of internal walls. Treatment of the inner walls only gave over 20 weeks complete control of *A. minimus*, of the ceilings 18 weeks, the others being relatively ineffective. A small series of trials of gammexane solutions on the eaves only, with a 5 per cent. solution (0.6 per cent. gammexane) gave 4 weeks' complete control, and 1½ per cent. (0.15 per cent. gammexane) 3 weeks' control. Equivalent figures for DDT solutions were: —5 per cent., 8 weeks; 1½ per cent., 1-6 weeks.

The general conclusion drawn is that emulsions of DDT are superior to solutions, though there is no such disparity in the case of gammexane; treatment of walls or ceilings only may be adequate, ceilings perhaps being easier and less subject to disturbance or re-surfacing. The author does not exclude the possi-

bility of repellent effects lessening the actual degree of malaria control achieved, but regards his figures as suitable guides to the type of treatment most likely to be successful. The rôle of gammexane remains unestablished, though the slight differences in its properties may give it some advantages when compared with DDT.

G Macdonald

MADDEN A H SCHROEDER H O & LINDQUIST A W Residual Spray Applications to Salt-Marsh and Jungle Vegetation for Control of Mosquitoes. *J Econom Entom* 1947 Feb v 40 No 1, 119-23

Rather heavy doses (15 to 30 gallons per acre) of 5 per cent DDT either in fuel oil aqueous emulsion or suspension were applied to marsh or jungle vegetation by the use of knapsack sprayers working on 6-foot swaths. The effects were estimated by the toxicity to flies and mosquitoes of vegetation cut from the treated plots at various periods up to 60 days and also by observations of mosquitoes caught in the treated and untreated areas. Additional tests were made with pyrethrum solution (1 per cent pyrethrins) and benzene hexachloride emulsion (5 per cent of BHC containing 12 per cent gamma isomer). The DDT suspensions gave the best results which ensured about 75 per cent reduction for forty six days. The BHC gave promising results especially in the first three weeks and might have been as good as the DDT at equal doses of active principle.

J R Burvine

HALL T F & HESS A D Studies on the Use of 2,4-D for the Control of Plants in a Malaria Control Program. *J National Malaria Soc* 1947 June v 6 No 2 99 116 5 figs

the sodium salt methyl ester and butyl ester of 2,4-D effectiveness was estimated by percentage changes in cover and density in treated as compared

butyl ester aqueous emulsion of methyl ester) were applied at dosages of 1 to 3 lb per acre in concentrations of 0.5 to 5 per cent 2,4-D in hand applications, 0.1 to 1.5 per cent in ground and boat power equipment and 20 to 72 per cent in airplane treatment. Details of spray equipment are given. It was found that 0.5 per cent solutions gave more even cover and therefore better results than 5 per cent solutions.

and black (Echinodorus radicans), giant ragweed (A. trifida L.), trumpet vine (Campsis radicans Seerman), water primrose (Jussiaea diffusa Forsk.) and wild cotton (Hibiscus spp.) were highly susceptible to the sodium salt at least when dewatered and all were effectively controlled at dosages of 1 lb 2,4-D per acre. Other species were highly resistant and difficult or impossible to control.

with a single application (*Typha latifolia* L., *Zizaniopsis miliacea*, *Scirpus cyperinus* L. and button ball, *Cephalanthus occidentalis* L.) and gave no reduction at 3 lb. per acre. Other species were intermediate in susceptibility; a considerable list of susceptible, less susceptible and resistant plants is given.

Airplane application appears to be the most satisfactory and economical method for area treatment against such species as lotus.

A higher recovery was observed with sprays of about 66 per cent. of material as compared with dusts (30 per cent.) in the centre 50 feet of the swath.

Such highly concentrated materials as 72 per cent. butyl ester, gave 100 per cent. kill over 112 feet swath, at an average dose of less than 1 lb. of 2,4-D and about 1 pint of liquid per acre. 10 per cent. dust at 2.5 lbs. 2,4-D per acre gave 60 per cent. reduction of cover after one application and a 90 per cent. reduction after an additional application was made 2 days later.

The results indicated that dusts were not so effective as sprays in equivalent dosages for lotus control.

On the basis of results obtained, the authors believe that the use of 2,4-D will provide a more efficient and economical means of control of terrestrial plants and of most stiff-stemmed annuals, when these create major malaria control problems, than control by mechanical means. It is pointed out, however, that some crop plants (e.g. cotton) may be highly susceptible to 2,4-D and that drift of small quantities a few hundred feet away from the site of application may have adverse effects on crops.

C. G. Johnson.

- i. McKEE, R. W., ORMSBEE, R. A., ANFINSEN, C. B., GEIMAN, Q. M. & BALL, E. G. Studies on Malarial Parasites. VI. The Chemistry and Metabolism of Normal and Parasitized (*P. knowlesi*) Monkey Blood. *J. Exper. Med.* 1946, Dec. 1, v. 84, No. 6, 569-82, 2 figs. [36 refs.]
- ii. GEIMAN, Q. M., ANFINSEN, C. B., McKEE, R. W., ORMSBEE, R. A. & BALL, E. G. VII. Methods and Techniques for Cultivation. *Ibid.* 583-606, 5 text figs. & 4 figs. on 2 pls. [49 refs.]
- iii. ANFINSEN, C. B., GEIMAN, Q. M., McKEE, R. W., ORMSBEE, R. A. & BALL, E. G. VIII. Factors affecting the Growth of *Plasmodium knowlesi* in Vitro. *Ibid.* 607-21, 1 fig.

i. In the first paper are described the results of a biochemical investigation on the blood of normal rhesus monkeys as compared with that of monkeys having a *Plasmodium knowlesi* infection. The object of the study was to obtain information regarding the necessary constituents of a medium suitable for the *in vitro* cultivation of the malarial parasites. In the first place it became clear that an adequate supply of glucose would be essential. The normal erythrocyte of the monkey, like that of the human being, depends on glucose, which it converts into lactate. Therefore if normal erythrocytes are to be present in a culture medium they will require a supply of glucose to keep them in good condition. It is found, however, that the parasitized cell consumes glucose at a rate 68 times that of the normal cell, the actual rate being at any time roughly proportional to the parasite mass. Unlike the normal cell, the parasitized cell can make use of lactate at a rate which is one-sixth of that at which it is produced from glucose. It can do this only in the presence of oxygen. It was found that the pyruvate concentration tended to parallel that of the lactate, so that it seems justifiable to conclude that pyruvate is a temporary intermediate oxidation product. The ability of the parasitized erythrocyte to oxidize lactate indicates that the parasite synthesizes oxidative enzymes, which do not occur in normal cells. Also the fact that the parasitized cell converts glucose to lactate suggests that the parasite synthesizes enzymes

conversion of glucose into lactate is far in excess of the rate of consumption of lactate by the parasitized cell adequate pH control could only be accomplished by dilution of the parasitized blood with a buffered isotonic nutrient medium or provision for the continual addition of glucose and removal of lactic acid from the whole blood by dialysis against a suitable nutrient medium. As regards the inorganic constituents of normal monkey plasma and erythrocytes these are similar to those of human beings. In the case of parasitized blood the inorganic phosphate values for plasma are higher during segmentation of

findings to the culture of *P. knowlesi* *in vitro*. Two different techniques have been perfected—one which is termed the rocher-dilution technique consists in diluting parasitized blood with a nutrient medium in a special cylindrical vessel which is provided with three chimneys—a large central one through which parasitized blood and medium can be introduced and two smaller ones near the ends for the maintenance of the gas phase consisting of a 5 per cent CO₂, 95 per cent air mixture. Into the vessel are introduced 8 cc of a

which is immersed in a quantity of the blood mixture while in the other the blood mixture in a tube covered at one end with a Cellophane membrane is immersed in a bath of medium. The various techniques are described in detail with the aid of diagrams.

iii In the third paper an account is given of the results of the culture experiments. It has been possible to obtain normal growth, segmentation and re-invasion in 24 hours in a medium containing only substances of known structure and purity. To obtain subcultures however a small amount of normal blood or serum must be added. Subcultures have been obtained for seven generations the infectivity of the final generation being demonstrated by

1000 c. 101.01 minutes. It has been shown that the parasites used glucose and *p*-aminobenzoic acid while absence of blocks of nutrient such as purines and pyrimidines, amino acids or water soluble vitamins has been shown to have a deleterious effect on growth. The assay of the nutritional requirements of the parasites is hampered by the nutrient arising from the red cells and plasma which are necessarily present. However the successful cultivation of parasites in cells washed free of plasma and resuspended in synthetic medium containing 1 per cent serum albumin seems to be a step towards removal of these interfering factors.

The three papers noted above review the previous work which has been carried out by other observers on the cultivation of malarial parasites and on their nutritional requirements. They give in detail the methods employed in

this investigation, the composition of the various media tested and the results obtained. Those interested in the biochemical aspects of the subject should study the papers themselves.

C. M. Wenyon.

SHEN, S. C., FLEMING, Eleanor M. & CASTLE, W. B. Osmotic and Mechanical Fragilities of Erythrocytes of Monkeys Infected with *P. knowlesi* Malaria. *Proc. Soc. Exper. Biol. & Med.* 1946, Nov., v. 63, No. 2, 419-22, 1 fig.

"Experiments with the blood of control and of *Macaca mulatta* monkeys infected with *Plasmodium knowlesi* indicate that the parasitized red blood cells develop increased osmotic fragility and *in vitro* are selectively destroyed by mechanical trauma. Consequently, it is suggested that because of this increased mechanical fragility of the red blood cells the motion of the circulation *in vivo* plays a part in the production of the hemolytic anemia in malaria of monkeys and, by analogy, of man."

HAAS, V. H., WILCOX, Aimee and EWING, Frances M. Non-Pigmented Forms of *Plasmodium gallinaceum* in Chick Embryos: Water Color Plates. *J. National Malaria Soc.* 1947, June, v. 6, No. 2, 122-3, 31 coloured figs. on 2 pls.

Colour plates illustrating the paper abstracted in this *Bulletin*, 1946, v. 43, 1114.

DOWNES, W. G. Infections of Chicks with Single Parasites of *Plasmodium gallinaceum* Brumpt. *Amer. J. Hyg.* 1947, July, v. 46, No. 1, 41-4.

Single parasites were isolated with a Chambers micromanipulator from infected chicken blood, diluted 1 in 2,000 with a mixture of 2 parts of 2 per cent. sodium citrate in normal saline and 1 part of normal chicken plasma. The material was inoculated into the hearts of chicks less than 10 days old. Four out of 46 chicks became infected and the disease ran the normal course, except for a prolongation of the incubation period and the greater synchronicity of schizogony. Gametocytes of both sexes were observed. Subinoculations were made, and in the new birds the usual exoerythrocytic cycle was demonstrated. Thus, a single trophozoite of *P. gallinaceum* has potentialities for the initiation of schizogonous, gametogonous and exoerythrocytic cycles.

P. C. C. Garnham.

BALL, G. H. Attempts to cultivate the Mosquito Phase of *Plasmodium relictum*. *Amer. J. Trop. Med.* 1947, May, v. 27, No. 3, 301-7, 4 figs. [15 refs.]

Culex tarsalis mosquitoes were infected with *Plasmodium relictum*. After six days, the insects were kept at a constant temperature of 18°C. for 40 or 50 hours and were deprived of food and water. After this interval the majority of stomachs became free of bacterial and fungal contaminants. Then, with aseptic precautions, the mid-gut was dissected out and placed in the culture medium in a Carrel flask. Several media were employed, Trager's medium, Trager's medium plus extra glucose, and different types of synthetic media (Kidder and Dewey). Various mixtures of gases were introduced into the flasks and the correct pH was maintained by gassing the medium daily with a mixture of sterile CO₂ and free air.

The stomachs remained alive for as long as 10 days, as proved by contractibility and by the normal structure of the nuclei, but the oöcysts remained cytologically completely unchanged, and no development occurred. This is apparently the first recorded attempt to cultivate *in vitro* the sporogonic stages of *Plasmodium* [it failed possibly owing to asphyxiation of host tissue or of the oöcysts themselves.]

P. C. C. Garnham.

STAUBER L A & WALKER H A Preparation and Properties of Erythrocyte-free Avian Plasmodia *Proc Soc Exper Biol & Med* 1946 Nov 1 63 No 2 223-7 4 figs on 1 pl [11 refs]

In order to prepare avian malarial parasites for use as an antigen it is necessary that the parasites should be completely freed from the erythrocytes originally containing them. With nucleated blood corpuscles this is not as simple as it is with non nucleated but the authors have devised a satisfactory technique. They first relieve the cells of their plasma membranes with saponin and then add an enzyme which destroys the nuclei though leaving intact (but not alive) the parasites and incidentally the leucocytes. Nineteen parts of duck blood infected with *P. lophurae* are drawn into 1 part of 0.9 per cent saline buffered at pH 7.0 and containing 300 mgm per cent of heparin. Centrifugation at 2 000 for 10 minutes brings down the cells which are washed with 2-3 volumes of buffered saline. The cells are then suspended in 20 times their volume of 1:5 000 saponin in buffered saline centrifuged for 20 minutes and the material is subsequently suspended in 10 times its volume in Seitz filtered enzyme solution prepared by dissolving 100 mgm of trypsin and steapsin in 100 cc of saline buffered at pH 5.0-5.5. Immediate centrifugation is then carried out with 1 volume of enzyme solution and the supernatant is washed twice with 1 volume of 10 ml. buffered saline containing 0.2 per cent formalin. P. C. C. Garnham

TRAGER W The Development of the Malaria Parasite *Plasmodium lophurae*
in Red Blood Cell Suspensions in Vitro J Parasitology 1947 Aug v 33
No 4 345-50 [11 refs]

The author employs the complicated medium devised in recent years by American malarialogists (TRAGER BALL ANFINSEN GERMAN and others see this *Bulletin* 1942 v 39 440 *ibid* 1943 v 40 675 *ibid* 1945 v 42 887) for growing malarial parasites. Three extracts are prepared (1) The culture medium containing essentially an excess of glucose and calcium pantothenate (2) a red cell extract and (3) the parasitized red blood cell suspension with a relatively low parasite density. The cultures are incubated at 40°C in Erlenmeyer flasks through which moist 95 per cent air-5 per cent CO₂ is passed and they are placed on a rocking machine. Subculture is performed after two days.

Regular multiplication occurs for
erate. Such cultures are really tis

Lepturae is hampered by a high oxygen tension and is favoured by glucose and calcium pantothenate

[The composition of the culture medium is so complex that it is unlikely that the method will come into routine use]

HUFF C G COULSTON F LAIRD R L & PORTER R J Pre-Erythrocytic
Development of *Plasmodium fophurae* in various Hosts *J Infect Dis*
1947 July Aug v 81 No 1 7 13 17 coloured figs on 1 pl

This paper is a continuation of the authors' studies on the development of the protozoite of the different species of avian malaria. The cycle has already been worked out for *P. gallinaceum*, *P. cathemerium*, and *P. relictum*; here *P.*

lophurae is studied. Turkeys, ducks, chickens and guinea-fowl were inoculated into the wing skin with sporozoites from infected *Aedes albopictus*. Biopsy at the site was then performed at varying intervals.

Normal developmental forms were almost exactly similar to *P. gallinaceum*, but a large number of degenerating parasites were encountered, more particularly in the duck and least often in the guinea-fowl.

The discussion in this paper raises a number of points of considerable interest and should be read in full. The authors state that as a result of these studies, it is no longer possible to measure susceptibility in the host solely by the degree of parasitaemia. Some parasites, e.g. *P. lophurae* in the guinea-fowl, exhibit numerous pre-erythrocytic forms, but a mild blood infection. The suitability of a host for a given parasite may be measured by (1) the ease by which it is adapted in the blood passage, (2) its infectiousness to mosquitoes; (3) the ability to produce exo-erythrocytic stages; and (4) the number and normality of the cryptozoites and metacryptozoites.

It is suggested that the pre-erythrocytic stages of malarial parasites will fall into the following groups [the species marked with an asterisk are those in which this stage is known]:—

1. Parasites with exo-erythrocytic stages of *P. gallinaceum* type: *P. gallinaceum*,* *P. lophurae**, *P. cathemerium**, *P. relictum**, *P. durae*, *P. circumflexum* and possibly *P. mexicanum* (which includes both *gallinaceum* and *elongatum* types in its exo-erythrocytic stage).

2. Parasites with exo-erythrocytic stages of *elongatum* type: *P. elongatum*, and perhaps *P. mexicanum*.

3. A doubtful category, where exo-erythrocytic forms are at present unknown. This included other species of avian and saurian malaria and monkey, bat and human malaria.

P. C. C. Garnham.

BLACKWATER FEVER.

LALICH, J. J. The Influence of Injections of Homologous Hemoglobin on the Kidneys of Normal and Dehydrated Animals. - *J. Exper. Med.* 1947, Aug. 1, v. 86, No. 2, 153-8, 3 figs. on 1 pl.

The author investigated the effects of intraperitoneal injections of homologous haemoglobin in normal rats and guineapigs, and of intravenous injections in rabbits. The haemoglobin solution used was prepared from homologous heart blood laked in distilled water, stroma was removed by centrifuging. No renal lesions were observed in the guineapigs.

or in the guineapigs. water for 1 to 5 days. in uraemia. Pigment casts, dilated tubules, and necrosis of tubular epithelium were observed in the animals deprived of water for the longest periods, and one or more of these features appeared in the control experiments in normal rabbits. "nephrosis" can be produced. precedes the intravenous injections of hemoglobin," and suggests that similar studies should be made in other species.

B. G. Macraeth.

LUCKÉ B Lower Nephron Nephrosis (The Renal Lesions of the Crush Syndrome of Burns Transfusions, and other Conditions affecting the Lower Segments of the Nephrons) *Milit Surgeon* 1946 Nov \ 99 No 5 371 96 16 figs (12 on 3 coloured pls) [92 refs]

This is an excellent account of the renal lesions seen in blackwater fever crush injury incompatible transfusion and other conditions usually referred to in Britain as renal anoxia. The pathological picture and pathogenesis are clearly discussed.

The author states that the syndrome was the most frequent form of renal dysfunction met in members of the United States Army during the recent war and the account is based on records and material from over 500 cases. The syndrome appeared in crushing injury non-traumatic muscular ischaemia eclampsia burns incompatible transfusion blackwater fever other intra-vascular haemolyses heat stroke sulphonamide and other forms of poisoning. The essential lesions in the kidney were restricted to the lower segments of the nephrons and comprised focal degeneration or necrosis heme casts secondary inflammatory reactions in the surrounding stroma and thrombosis of thin walled veins. The pathogenesis could not be established. Factors concerned were degradation products of haemoglobin and myoglobin physicochemical alteration of body fluids and blood shock and disturbances of renal flow arising from ischaemia of the kidney. Renal insufficiency according to the author arose from the activity of three factors mechanical blockage of the tubular lumen by casts inadequate glomerular filtration and disturbances of electrolyte balance of body fluids.

The original paper is recommended to all interested in this subject.

B G Macgrath

TRYPANOSOMIASIS

VAN HOOF L M J J Observations on Trypanosomiasis in the Belgian Congo *Trans Roy Soc Trop Med & Hyg* 1947 July \ 40 No 6 728-54 [30 refs] Discussion 755-61 (CHESTERMAN C C DAVEY D G HOARE C A LORIE E M VAN HOOF L M J J (in reply))

This is the second Royal Society of Tropical Medicine and Hygiene Chadwick Lecture.

For many years past the campaign against sleeping sickness in the Belgian Congo has depended mainly on mass treatment of the affected population. Each year since 1926 between about 2 million and 5 million people have been examined those found to be infected being subjected to courses of treatment but instead of an ever-diminishing incidence of new infections the original over all rates of about 1 to 1.2 per cent led to an equilibrium maintained for the past decade at about 0.25 per cent. Coincidentally from practically all endemic zones came reports of an increasing prevalence of cases resistant to arsenical treatment. Before 1938 about 7 per cent of new cases in the Léopoldville area for example were trypanamide-resistant. The proportion has since reached 50 per cent or more in this as well as in a number of other areas. So serious has the incidence of arsenic resistance become that since 1938 the Directorate of Medical Services has believed it necessary to modify the programme of mass therapy and to give greater prominence to chemoprophylaxis by suramin and diamidines. This trend was accelerated because of staff shortages during the war. In 1946 there were 50 000 subjects under observation after protection with pentamidine and propamidine and there should be a total of 175 000 in 1947. A single dose of pentamidine is believed to confer protection

for 6 months, as compared with only 3 months in the case of suramin [VAN HOOFF, HENRARD and PEEL, this *Bulletin*, 1947, v. 44, 979]. Propamidine has been found to exercise about the same degree of protection as pentamidine, and detailed reports will appear later, but meanwhile it is noted that pentamidine is preferred, since a number of unexpected toxic effects, such as abortion, have been encountered in the use of propamidine.

The increasing prevalence of trypanosome strains resistant to arsenicals may be attributable either to an actual production of such strains as a result of treatment, or, as suggested by RABLOVATZ (this *Bulletin*, 1933, v. 30, 776), to a selection of those which are naturally resistant.

The available evidence points towards the latter mechanism as being more responsible than the former for the great increase of arsenic-resistance in the Belgian Congo. The idea that naturally resistant strains may occur has frequently appeared in the literature, since attention was drawn to this feature during early trials of atoxyl by BRODEN and RODHAIN about the year 1905. Actual proof of the occurrence of such naturally resistant strains is, however, difficult in the Belgian Congo, where arsenicals are widely employed for so many diseases, but an appreciable incidence of resistant cases is frequently encountered in areas where the influence of any previous arsenical therapy may be reckoned as negligible.

With regard to the development of resistance during treatment, trypanosomes from patients who have relapsed after standard courses of tryparsamide treatment do not necessarily exhibit any resistance. One patient was observed for 15 years, during which he relapsed repeatedly in spite of repeated tryparsamide treatment. Trypanosomes examined at the fourth relapse still failed to show evidence of resistance. In experimental animals, the facility with which resistance arises during treatment is extremely variable under conditions which are kept fairly constant. The protocols reproduced to illustrate these conclusions are, however, not easy to interpret unequivocally.

VAN HOOFF says that he has modified his earlier opinion on the cyclical transmissibility of acquired resistance, by now concluding that this character is not invariably transmitted by *Glossina*. The hypothesis is advanced that "a resistant strain is generally composed of trypanosomes with varying degrees of resistance; the more resistant constituting the minority which assures the survival of parasites after administration of a trypanocidal drug. When this strain is transmitted mechanically—a method which uses a large number of flagellates in a few drops of blood—the resistant character remains constant in the succession of animals inoculated. When, on the other hand, it is transmitted by the fly, two factors intervene to bring about a selection between resistant trypanosomes and others: the small number of flagellates necessary for a cycle, and the fact that the ability to develop in the fly diminishes in trypanosomes which have been affected by trypanocidal drugs while at the same time their resistance increases".

The question whether trypanosomes in the deep organs present the same reactions to arsenicals as those in the peripheral blood has been examined by studying trypanosomes taken from the cerebrospinal fluid. In general, such trypanosomes reacted to arsenicals in the same way as those taken from the blood. However, they were only occasionally transmissible by tsetse, and usually could not be grown in the medium of BRUTSAERT and HENRARD (this *Bulletin*, 1938, v. 35, 704).

As for the treatment of advanced cases of tryparsamide-resistant sleeping sickness, VAN HOOFF has been very favourably impressed with melarsen oxide [WEINMAN and FRANZ, this *Bulletin*, 1946, v. 43, 207]. Melarsen [FRIEDHEIM, this *Bulletin*, 1941, v. 38, 634] is too toxic and is not recommended.

Just as there are probably trypanosome strains naturally resistant to arsenicals so there is evidence of strains naturally resistant to tartar emetic and to suramin respectively. Strains resistant to these compounds are, however, not as common as those resistant to arsenicals. They occur especially in areas where there are many arsenic resistant cases.

The possible rôle of domestic animals as a reservoir of *T. gambiense* is not altogether negligible. Natural infection of a dog has been observed. The parasite can be maintained by cyclical transmission in pigs for many years [VAN HOOF HENRARD and PEEL this Bulletin 1943 v. 40 367 1944 v. 41 466]. Trypanosomes are remarkably scanty in the blood of pigs but transmissibility is high in the first passages decreasing towards the end of a series of infections. The situation appears to be similar in goats. Trypanosomes harboured by these various species of domestic animal (or by antelope) remain cyclically infective for man though this property may disappear after a prolonged stay in any given host.

Variations in virulence for man are described within three categories [LESTER this Bulletin 1934 v. 31 569 VAN HOOF HENRARD and PEEL this Bulletin 1938 v. 35 698]. The most virulent of these three types occurs sporadically in all areas and presents many of the features of infection by *T. rhodesiense* including resistance to tryparsamide. The trypanosomes from such cases especially in relapses after treatment are only feebly or not at all capable of fly transmission.

T. brucei is rare in the endemic sleeping sickness areas corresponding with the paucity of game. Experiments with this trypanosome are described. The work was done with three strains obtained from natural infections in a dog a pig and a goat respectively. Fly transmitted infections of these strains were practically symptomless in pigs, tending to die out in 12 to 15 months, serious in goats with brain lesions, keratitis and c.s.f. changes ending fatally in 3 to 5 months and of the classically acute type in dogs. The monkey *Cercopithecus galentus aethiops* becomes infected only with difficulty. Seven human volunteers proved refractory to infection by the bite of tsetse flies infected even with serum-resistant trypanosomes though one of the subjects showed trypanosomes in the blood transiently about 3 weeks after being bitten by a single infected fly. Thereafter his blood became permanently free of trypanosomes and he never developed any symptoms.

Immunity in man and animals was found to be only of short [unspecified] duration in man and animals cured of *T. gambiense* infections. Unpublished work by BRITSAERT and HENRARD showed that the blood of an untreated patient inhibits cultures of *T. gambiense* but no such inhibition is exercised by blood from a cured or apparently cured patient. The blood of an animal carrier of *T. rhodesiense* or *T. brucei* prevents the growth of *T. gambiense* and inversely but *T. congolense* grows in the presence of blood from carriers of any of the other trypanosomes mentioned.

As for variations in the cyclical transmissibility index both in man and in animals the index is at a maximum at the height of infection that is in the earliest stages of infection and it diminishes to nil as the subject passes into the chronic stage. It is not possible to forecast the degree of transmissibility merely by the number of trypanosomes in the blood at the time of feeding tsetse without due regard to the host species concerned since the index may be very high in a pig even when diagnosis can be made only by culture and it may be nil in heavily infected gamepigs. In any individual man or animal however the index varies directly with the intensity of blood infection. It is diminished by chronicity of infection by drug resistance and by exalted virulence. No evidence was obtained that transmissibility is a function mainly of short forms of the trypanosome as had been postulated by M. ROBERTSON.

[Report of the Sleeping Sickness Commission, 1912, 12, 138; *ibid.*, 1913, 13, 94], or of any other morphological type.

In the discussion following this lecture, Dr. C. C. CHESTERMAN drew special attention to the remarkable scale on which mass treatment has been conducted in the Belgian Congo. About 10 years ago, nearly half the entire population was examined annually, a feat probably unequalled in any other territory. He also mentioned that for the past 50 years, 100,000 people have been dying annually from sleeping sickness in Central Africa, but the number has been greatly reduced. This improvement, together with advances in other directions, is likely to lead eventually to serious population pressure, as has developed in India. Dr. D. G. DAVEY referred to the danger of producing cryptic infections by the use of prophylactic treatment. Dr. C. A. HOARE pointed out that BRUTSAERT and HENRARD's *in vitro* demonstration, noted above, of immunological relationships between *T. gambiense*, *T. rhodesiense* and *T. brucei* lends further support to the close affinity between these trypanosomes already established on morphological grounds. The present reviewer discussed aspects of

the treatment of advanced sleeping sickness.

E. M. Lourie.

WEINMAN, D. Cultivation of African Sleeping Sickness Trypanosomes on Improved, Simple, Cell-free Medium. *Proc. Soc. Exper. Biol. & Med.* 1946, Nov., v. 63, No. 2, 456-8.

The author has produced a new solid medium for the cultivation of *T. gambiense* and *T. rhodesiense*, of the following composition: (1) Base (autoclaved portion):—nutrient agar 31 gm., distilled water, to make 1 litre; (2) Non-autoclaved portion:—inactivated human citrated plasma 12.5 cc., human red cells 12.5 cc. To make 100 cc. of medium 25 cc. of (2) are added to 75 cc. of the base (1). The medium is put up in Kolle flasks or slanted in test-tubes, which are kept at room temperature after inoculation of the trypanosomes. In this medium growth is abundant, the time of development depending on the size of the inoculum. When the inoculated blood contains from 1,000 to 10,000 trypanosomes growth in culture is detectable in 5 days and is heavy after 10; when only 10-100 trypanosomes are present the cultures are positive after 10 days. Heavy growth is usually maintained for 10 days, after which the number of trypanosomes declines, being scanty after 35-40 days, though sometimes persisting for more than 60 days. The maintenance of sub-cultures may be achieved by freezing the cultures and storing them for prolonged periods at -70°C . [see WEINMAN & McALLISTER, below, p. 1,100]. One flask culture may yield from 10 to 15 million trypanosomes, which can be washed in Tyrode's solution and concentrated by centrifugation. Multiplication in culture is intense, an inoculum of 100 trypanosomes giving rise to about 30 million in a few weeks.

C. A. Hoare.

FAIRBAIRN, H. & CULWICK, A. T. The Modification of *Trypanosoma rhodesiense* on Prolonged Syringe Passage. *Ann. Trop. Med. & Parasit.* 1947, May, v. 41, No. 1, 26-9.

A comparison is made of two substrains of a strain of *T. rhodesiense* isolated One substrain was maintained in Tanganyika cyclically infected tsetse flies, and the where it was maintained by syringe passages through mice. While the African substrain was polymorphic, being

represented by long intermediate and short forms negatively or positively charged [see this *Bulletin* 1947 v. 44 649] the English substrain had become monomorphic and was represented only by long forms. Furthermore, their mean length was reduced to 23.29μ as compared with $25-63\mu$ of the corresponding forms in the cyclically transmitted substrain. Since syringe-passaged strains of trypanosomes of the *brucei* group gradually become more sensitive to arsenicals the results of tests of such drugs upon laboratory strains cannot be applied to normal cyclically transmitted strains of man in Africa. Hence the authors conclude that if chemotherapeutic research in trypanosomiasis is to be really effective all new drugs should be tested on strains of *T. rhodesiense* which are polymorphic and which have been and are being transmitted by *Glossina*.
C. A. Hoare

FERREIRA F. S. da C. Sobre a biologia da *Glossina palpalis* da Guiné Portuguesa. I. Nota preliminar. The Biology of *G. palpalis* in Portuguese Guinea. *An. Inst. Med. Trop. Lisbon* 1946 Dec. v. 3 93-141 1 text fig. & 12 figs on 6 pls. 31 refs. English summary.

Although the Portuguese colonies in Africa are infested by tsetse and affected by trypanosomes less work has been done there than in certain other parts of the Continent. One therefore welcomes this paper which is an account of work on *Glossina palpalis* carried out in Portuguese Guinea. In this territory *G. palpalis* is much the commonest species of tsetse. The information here about the biology of the fly is interesting as confirming investigations carried on in other territories but it does not contain a great deal that is new.

Investigations of the effects of climatic factors on the physiology of the fly are given with some notes on trapping and other control measures. Epidemiological investigations suggest that there has been an increase in the proportion of flies infested with polymorphic trypanosomes within the last 15 years in Portuguese Guinea.
Kerstin Mellorby

PINTO A. R. El diagnóstico de laboratorio de la enfermedad del sueño y su relación con la revisión de enfermos. The Laboratory Diagnosis of Sleeping Sickness and its relation to Re-examination of Patients. *Med. Colonial* Madrid 1947 Aug. 1 v. 10 No. 2 88-100.

VAN DEN BERGH* L. Trypanosomose d'un poussin éclos après inoculation chorio-allantoïque de *Trypanosoma evansi*. Trypanosomiasis in a Chick hatched after inoculation into the Chorio-Allantoic Membrane with *Trypanosoma evansi*. *Acta Biol. Belgica* 1941 v. 1 No. 1 146-51 1 chart.

The subject matter of this paper has been more fully reported in a later publication see this *Bulletin* 1945 v. 42 611.

MOULDER J. W. Effect of Age of Infection upon the Oxidative Metabolism of *Trypanosoma lewisi*. *Science* 1947 Aug. 22 168-9.

SCHUELEP F. W. CHEN G. & GEILING E. M. H. The Mechanism of Drug Resistance in Trypanosomes. I. A Method for differentiating Strains of Resistant Trypanosomes. *J. Infect. Dis.* 1947 July-Aug. v. 81 No. 1 14-18 2 figs.

A method has already been described by CHEN and GEILING (this *Bulletin* 1946 v. 43 315) for measuring the antitrypanosome effect of antimonials by determining the extent to which these compounds inhibit the parasites utilization of glucose *in vitro*.

The method has now been used for measuring the antitrypanosome effect of an arsenical (the arsenoxide "Mapharsen") on three strains of *T. equiperdum*, one of which is normally sensitive, one slightly resistant, and the other highly resistant to arsenicals; in this way the strains were compared with one another quantitatively in respect of the degree of resistance exhibited by each. The slightly resistant strain had been obtained from the sensitive one by treating infected rats with small doses, and also by *in vitro* exposure of the trypanosomes to non-sterilizing concentrations of the arsenoxide. The manner in which resistance arose in the third strain is not stated.

Where the anti-trypanosome effect was measured by determining the concentration of arsenoxide necessary to effect a 50 per cent. reduction in glucose utilization under the experimental conditions described, the relative degrees of resistance of the three strains were found to be in the proportions of 1, 2 and 7. Appropriate treatment of the data concerned, showed the differences to be statistically significant.

It is arguable to what extent inhibition of glucose utilization reflects the lethal action of the drug on the parasite. It is suggested that 15 per cent. inhibition might be suitable as a measure of mere toxicity, and 90 per cent. as representative of lethal action. In the former case, the differences between the resistant factors of the strains are considerably less, and in the latter considerably greater, than in the proportions of 1 : 2 : 7 obtained when 50 per cent. inhibition is the criterion.

The strain of low resistance lost this character completely in the course of 4 serial passages in rats. In the highly resistant strain, however, the resistance seems to be permanent. It is therefore concluded that there must be fundamental differences in the nature of the resistant properties exhibited by these two strains.

E. M. Lourie.

BARLOW, F. & HADAWAY, A. B. Preliminary Notes on the Loss of DDT and Gammaxane by Absorption. *Bull. Entom. Res.* 1947, Aug., v. 38, Pt. 2, 335-46.

These experiments were done in connexion with tsetse fly control and, accordingly, *Glossina palpalis*, as well as mosquitoes, were used to give biological assessment of insecticidal action. Other data were obtained by chemical estimations.

Tests with sprayed vegetation.—Two types of leaves, both common near Lake Victoria, were used, one with a hard surface, and one a soft and hairy one. Leaves on growing plants were sprayed with DDT or gamma benzene hexachloride ("gamma BHC") in kerosene-cotton-oil solution or in emulsions, and examined at intervals, chemically and biologically. By comparing external leachings with extractions from dried and macerated leaves, it was found that from 20 to 50 per cent. of the insecticide was absorbed into the interior of the leaves. The amounts of insecticide both internal and external, progressively declined with ageing.

Applications to mud and thatch.—These tests were made in connexion with mosquito control, but *Glossina* was used in most of the tests. Applications of DDT and gamma BHC were made to dried mud, thatch and to glass plates. It was found that applications of solutions or emulsions of insecticides to dried mud resulted in considerable penetration of the insecticide below the surface; with aqueous suspensions, on the other hand, the insecticide was deposited superficially. These results of chemical estimations of different levels were supported by biological data which showed that the aqueous suspension deposits were more highly insecticidal than that of solutions or emulsions.

The same effects were observed to a lesser extent with grass thatch and not at all with the impermeable glass plates.

Applications to lime wash—DDT sprayed in solution on to glass plates coated with a thin film of lime wash was rendered much less insecticidal than lower deposits applied to plain glass. Chemical extractions proved that the DDT was not altered chemically to any great extent apparently it was physically absorbed or merely masked by the particles of lime. Experiments showed that this effect was much less marked if the DDT were applied in suspensions (containing only 50 per cent inactive material). Results with a suspension containing a sticker (sulphite lye) showed that this material was also liable to mask DDT toxicity presumably by coating the particles.

J R Bustinne

See also p 1103 HAKAMIAN The Persistence of DDT on Cattle

HAWKING F Growth of Protozoa in Tissue Culture. III *Trypanosoma cruzi*
Trans Roy Soc Trop Med & Hyg 1946 Dec v 40 No 3 345-9,
13 figs (2 on pl)

The author employs his *P. gallinaceum* technique this Bulletin 1946, v 43 410, for growing *T. cruzi* in tissue cultures of heart liver and subcutaneous tissues of rat embryos and of chick embryo brain. The trypanosomes were obtained free of red blood cells by centrifugation of infected mouse blood and were introduced into the growing implants on the third day. They multiplied extra-cellularly for two days then became fewer until the twelfth day when at later in small numbers up ntal forms were numerous in cells. In many cases the parasitized cells appeared to be damaged—the cytoplasm was vacuolated and the nucleus pyknotic. The leishmanoid forms sometimes showed two parabasal bodies whilst later a tiny granule (blepharoplast) appeared beside this structure. Eventually the complete trypanosome is formed and becomes extra-cellular.

P C C Garuham

FLOCH H & DE LAJUDIE P Recherches sur la trypanotomiose humaine américaine en Guyane française. *Rhodnius prolixus* et *Rhodnius pictipes* vecteurs naturels de choro de *S. cruzi* [*R. prolixus* and *R. pictipes* as Natural Vectors of *T. cruzi* in French Guiana] Bull Soc Path Exot 1947 v 40 Nos 5-6 157-60

HAUSCHKA T Saxe L H Jr & BLAIR Margaret *Trypanosoma cruzi* in Treatment of Mouse Tumors J National Cancer Inst 1947 Feb v 7 189 Summary taken from J Amer Med Ass 1947 Sept 6 v 135 No 1 60

Hauschka and his co-workers observed that infection with *T. cruzi* (Brazil strain) signified carcinoma H9 in A mice and 37 in white mice of ur adenocarcinoma in C3H mice was lightly retarded in growth. The infection was more virulent in A than in C3H mice. The inhibitory effect appears to be nonspecific since it was frequently accompanied with loss in body weight and parasitemia of vital organs such as heart lungs and intestine. Cancer cells were rarely parasitized. Leishmanian and crithidial forms of *T. cruzi* were more abundant in the stroma and the connective tissue surrounding some tumors. Retardation in tumor development did not result in longer survival. Endotoxin prepared from heat killed cultures of *T. cruzi* (Brazil strain) was,

without effect against carcinoma 119 or against transplantable and spontaneous mammary tumors. The authors conclude that the results they obtained are not to be considered as contradicting the results of the Russians, Roskin and Klyueva, as their strain of *T. cruzi* has not been available to Hauschka and his co-workers.

LEISHMANIASIS.

SEN GUPTA, P. C. History of Kala-Azar in India. *Indian Med. Gaz.* 1947, May, v. 82, No. 5, 281-6, 2 maps. [19 refs.]

FENG, L. C. & CHUNG, H. L. Experiments on the Transmission of Kala-Azar from Dogs to Hamsters by Chinese Sandflies. *Chinese Med. J.* Peiping Edition. 1941, Nov., v. 60, No. 5, 489-96. [11 refs.]

"1. Transmission experiments of kala-azar from dogs to hamsters by means of sandflies are reported.

"2. Two out of 8 hamsters inoculated intraperitoneally with flagellates from *P. sergenti* var. *mongolensis* fed previously on infected dog developed kala-azar.

"3. Six out of 20 hamsters inoculated intraperitoneally with flagellates from *P. chinensis* fed previously on infected dog develop kala-azar.

"4. One out of 5 hamsters inoculated percutaneously with flagellates from *P. chinensis* also became infected.

"5. Successful transmission of kala-azar from dog to hamsters through the bite of *P. chinensis* is reported for the first time.

"6. These experiments gave further support to the view that *P. chinensis* is the important transmitter of kala-azar in China."

SHIH LU CHANG. Studies on Haemoflagellates. I. A Semi-Solid Medium and a Fluid Medium with a Solid Base for growing various Species of *Leishmania* and *Trypanosoma cruzi*. *J. Infect. Dis.* 1947, Mar.-Apr., v. 80, No. 2, 164-71. [10 refs.]

The author has devised two new media for the cultivation of haemoflagellates. Composition: bacto-tryptose, 2.0 gm.; NaCl, 4.0 gm.; KCl, 0.4 gm.; Na_2PO_4 , 5.0 gm.; bacto-agar, 2.0 gm.; distilled water, 1 litre. The medium is autoclaved and 150 ml. horse serum + 20 ml. horse haemoglobin solution are added to it. After mixing, the solution is distributed into tubes or flasks. The second medium is fluid, with a solid base; its ingredients are the same as above, but agar is omitted. The solution is divided into two portions, measuring 600 ml. and 400 ml., respectively. To the larger volume are added 7.2 gm. of agar, the mixture is boiled until the agar is dissolved, and dispensed in 20-25 ml. amounts into Erlenmeyer flasks. These flasks and the 400 ml. of fluid medium are autoclaved, after which the flasks are cooled in an upright position to allow the agar base to solidify at the bottom. To the fluid medium are added 60 ml. horse serum + 8 ml. haemoglobin solution and the resulting mixture is dispensed in 15 ml. amounts over the solid base in the flasks. Both media produced much better growth of *L. donovani*, *L. tropica*, *L. brasiliensis* and *T. cruzi* after a shorter period of incubation at room temperature than the

media usually employed for the cultivation of these haemoflagellates. The maximum numbers are reached in about one week in the case of the medium containing the fluid and several days later in the semi-solid one.

C A Hoare

SHIH LU CHANG & NEGHERBOV W O Studies on Haemoflagellates II A Study of the Growth Rates of *Leishmania donovani*, *L. brasiliensis*, *L. tropica* and *Trypanosoma cru* in Culture J Infect Dis 1947 Mar-Apr v 50 No 2 172-84 7 graphs

Using the fluid medium with a solid base described in a previous paper (see preceding abstract) the authors studied the rates of growth of cultures of

of these flagellates grows well at body temperature. *L. donovani* tolerant none of these flagellates grows well at body temperature. *L. donovani* tolerant none

C A Hoare

DOSTROVSKY A & SAGHER F Diagnostic Significance of the Culture Method in Cutaneous Leishmaniasis (Oriental Sore) Arch Dermal & Syph 1946 Nov v 54 No 5 543-51 4 figs [Refs. in footnotes]

It is noted that in relapsing cases the lesions are

negative in smears but positive in cultures. 10 were negative in both and two were positive in both. Some of these were relapsing cases while others had lesions of several years duration. It is evident that the culture method of diagnosis is of value particularly in the old chronic case in which the lesions may resemble those of lupus or syphilis.

C M Wenyon

FEVERS OF THE TYPHUS GROUP.

GIROUD, P. & JUDE, A. Au sujet de la réaction de fixation du complément. Pouvoir antigène des constituants d'un vaccin antityphique. Résultats chez des vaccinés et des convalescents. [On the Complement-Fixation Reaction. Antigenic Potency of the Constituents of Anti-Typhus Vaccine. Findings in Vaccinated Persons and Convalescents.] *Bull. Soc. Path. Exot.* 1947, v. 40, Nos. 5/6, 142-7.

The authors describe tests carried out with antigens prepared from formolized rabbit-lung vaccine. Similar and satisfactory results were obtained from the use of the whole vaccine and also from its rickettsial content and the supernatant fluid obtained by centrifugation.

With very small doses of the whole vaccine as antigen, fixation tests were carried out on the sera of 45 persons who had received the last of three doses of vaccine eight days previously; the reaction is described as very strong in 35 cases; it was strong in four, positive in two, and feeble in one. The remaining three sera were anti-complementary.

The Weil-Felix reaction remained negative in all these cases, whereas there was a rising-titre reaction in every one to the rickettsia-agglutination test.

A curious case is described in which a man, after a heavy bout of drinking, had a sudden rise of temperature to 40.7°C., with diarrhoea and vomiting.

The Weil-Felix test was carried out. The titre of 1-800, and an OXR titre of 1-50 against OX19. Temperature—about four days later—all the responses were negative except for a titre of 1-50 against OX19. Complement-fixation and rickettsia-agglutination tests carried out on both occasions were completely negative.

From all the above findings, the author concludes that the Weil-Felix test is less specific than the other two.

John W. D. Megaw.

HOLLER, G. & ZAJITSCHK, R. Eine sehr erfolgreiche, streng kausalpathogenetisch eingestellte Therapie des Fleckfiebers. [A very Effective and strongly Specific Treatment for Typhus Fever.] *Med. Klin.* 1944, Apr. 28, v. 40, Nos. 17/18, 247-50, 5 charts.

The authors claim that two new proprietary drugs introduced by the Bayer firm have a powerful antibacterial action on the rickettsiae of typhus fever. The drugs are called "Nitroacridin 3582" and "Rutenol"; the latter is said to be Nitroacridin in combination with arsenic.

The evidence produced to substantiate the authors' claim is a description of five cases treated by one or other of the drugs. One of the patients died; his case is said to have been quoted as a warning against using too small doses of the drugs; another patient had been inoculated with a typhus vaccine; the course of the disease as shown by the charts of the remaining three cases does not appear to differ from that observed in many cases treated without special drugs.

The preparations are claimed to be effective also in trench fever and typhoid fever; if they turn out to be of value, more will be heard of them.

John W. D. Megaw.

FLECK, L. Specific Antigenic Substances In the Urine of Typhus Patients. *Texas Reports on Biol. & Med.* 1947, v. 5, No. 2, 168-72.

The author in 1942 injected 10 cc. of urine from a typhus patient into a rabbit by the intravenous route with the result that the animal gave a positive Weil-Felix reaction at a titre of 1-320.

In further experiments it was found that antigens began to appear in the urine of patients on the second day of the fever and that rabbits inoculated with urine of patients sometimes showed reactions at titres of 1-640 or 1-1 280.

By methods of purification and concentration which are described in the paper it was found possible to prepare a protective vaccine from the urine. This vaccine was found protective to guinea-pigs and was used to vaccinate 500 persons. The after history of the vaccinated could be obtained only in the cases of the author his family and three other persons all of whom afterwards had mild or abortive attacks of typhus fever whereas other prisoners in the hands of the Germans at the time had severe attacks with a fatality rate of 30 per cent.

The experiments were carried out while the author was working in the Ghetto Hospital at Lwow Poland during the German occupation.

John W D Megaw

WEIGL R Immunization against Typhus Fever in Poland during World War II *Texas Reports on Biol & Med* 1947 v 5 No 2 177-9

The author expresses his views on the comparative value of the chief typhus vaccines used during the last war.

One million civilians in East Poland were vaccinated with louse vaccine, and although only 25 to 30 louse intestines were used for each person instead of the full dose of 100 intestines the effect exceeded all expectations.

A comparative study in the laboratory showed that the louse vaccine was preferable to the mouse-lung vaccine of which some batches were entirely inactive.

Strains of *Rickettsia prowazekii* maintained in the author's laboratory by repeated transfer through mice are said to have slowly but steadily approached to the murine type. The author states that vaccines of the murine type do not protect against louse borne typhus.

Cox type vaccine produced early in the war by the Behring firm in Germany was either valueless or of little protective value but when prepared in Lwow according to the advice of the author a much higher standard of potency was reached. Rigorous controls and alternate passages from yolk sac cultures to lice were employed.

Even the best yolk sac vaccines were found inferior to the louse vaccine both in the degree and duration of the resultant immunity.

No details are given of the data on which the above conclusions are based.

John W D Megaw

MOSING H Methods of Evaluation of Typhus Vaccine Potency *Texas Reports on Biol & Med* 1947 v 5 No 2 173-6 1 chart

The author working at the Weigl Institute in Lwow found that mice after inoculation with varying doses of louse vaccine responded to the Weigl (rickettia agglutination) test at titres which varied directly with the dose of the vaccine. The doses ranged from 0.0025 of a louse intestine to 100 louse intestines the titres ranged from less than 1-10 to 1-1 280.

The vaccinated mice and controls were challenged by injections of 30 intestines of heavily infected lice. Control mice and mice vaccinated with small doses—up to 0.5 of an intestine—reacted at titres below 1-40 and all of them died. Mice receiving one or two louse intestines reacted at 1-40 and had attacks of typhus from which they recovered. Mice receiving larger doses reacted at higher titres and none of them was attacked.

John W D Megaw

RAYNAL, J. H. Etudes sur le typhus. Son comportement à Chang-Hai de 1938 à 1945. [Studies of Typhus. The Behaviour of the Disease in Sbanghai from 1938 to 1945.] *Méd. Trop.* Marseilles. 1947, Mar.-Apr., v. 7, No. 2, 91-147, 11 graphs (3 folding). [80 refs.] -

This is a more detailed version of a paper already reviewed in this *Bulletin* [1947, v. 44, 893]. It contains the graphs and statistics for which room could not be found in the previous article, and also a full discussion of the relationship between murine and epidemic typhus.

The author claims that the survey carried out from 1938 to 1934 shows:— (1) That murine typhus is constantly present as an enzootic disease in Shanghai, (2) That human infection of rat or rat-flea origin is liable to occur at any time in sporadic form; (3) That in exceptional circumstances murine rickettsiae can adapt themselves to transmission by lice from man to man and so give rise to epidemics, these circumstances include (a) the occurrence of epizootics of the disease among rats in the spring season when human lice are specially numerous and active, and (b) the existence of crowding and other conditions favourable to louse transmission; (4) That severe and persistent epidemics cannot occur in Shanghai because louse transmission becomes arrested in very hot weather, so that epidemics such as started in the spring in

	Jan	Feb.	March	April	May	June
Human cases of typhus fever ...	34	64	109	199	292	203
Percentage of rats showing OX19 titres of 1-100 or over ...	0	16.6	21.8*	7.9	3.4	6.2
<i>Xenopsylla cheopis</i> index among rats ...	0.17	0.13	0.13	0.04	0.52	1.54

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Human cases of typhus fever ...	119	37	36	40	39	50
Percentage of rats showing OX19 titres of 1-100 or over ...	1.8	12.7	14.1	9.3	17.7	9.1
<i>Xenopsylla cheopis</i> index among rats ...	4.6	3.3	2.35	2.18	1.65	0.82

*Including one period of 10 days in early March in which the percentage rose to 60.

The author states that two strains of rickettsiae recovered from patients during the 1938 epidemic were of the murine type, though both showed a tendency to approach to the "intermediate" type.

The paper deserves close and critical examination by those interested in the controversial problem of the relationship between murine and epidemic typhus. The number of rats examined in each month is not stated, the total number examined during 1942 was 707, so that the monthly average must have been less than 60 and the average for each 10-day period less than 20.

John W. D. Megaw.

KIRBY F G Para-Aminobenzolic Acid in the Treatment of Endemic (Murine)
Typhus Fever *Ann Western Med & Surgery* 1947 July v 1 No 3
203-5 1 pg

1 The use of para aminobenzoic acid and the sodium salt of para aminobenzoic acid in the treatment of a patient with endemic typhus fever is reported.

2 Marked improvement in the general condition of the patient was observed following the oral administration of para amino-benzoic acid and its sodium salt.

3 Toxic effects were not noted following the use of these drugs

GRIFFITHS J T Jr A Further Account of Tsutsugamushi Fever at Sansapor,
 Dutch New Guinea *J Parasitology* 1947 Aug 1 33 No 4 367 73
 2 figs

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ground
so that as
of the drum

The environments studied were (1) climax rain forest (2) abandoned village

created all total 16 mites were *I. richmanni* (syn *I. buloloensis*) but no mites of this species were ever found on rats

Clearing of areas caused no material reduction in the number of rats captured but the number of mites on each rat was greatly reduced.

In large grassy areas which appeared to be uniform in the matter of risk of infection there was sometimes a high incidence of the disease among troops occupying one small patch and no cases from other parts of the area.

John W D Megaw

See also p 1064 ELISHWITZ Epidemic Control with DDT, ANTU and 1080

LOUYEAUX J Aspects cliniques du Scrub Typhus sur le Front Birman
[Clinical Aspects of "Scrub Typhus" on the Burma Front] Ann Soc
Belge de Méd Trop 1947 Mar 31 v 27 No 1 105-38 5 figs [23 refs]

This is a clear and concise description of the signs and symptoms observed in 51 cases of scrub typhus seen during the last four months of 1944 at the Belgian Field Hospital during the advance of the East African Division in North West Burma.

48 hours or less before death including four who suddenly became jaundiced

Only one patient had an eschar a faint rash was seen in two cases it was restricted to the back and shoulders All but two of the patients were East Africans

John W D Megaw

FINLAND, M. & LESSES, M. F. Q Fever. Report of a Case. *New England J. of Med.* 1947, Aug. 21, v. 237, No. 8, 255-8, 2 figs. [18 refs.]

"A case of Q fever occurring in Boston but originating in the vicinity of Naples, Italy, is reported. The clinical features were those of a nonbacterial pneumonia. The diagnosis was suspected on epidemiologic grounds and established by the demonstration of a rise in antibodies for *Rickettsia burneti* in the serum during convalescence."

BUHLER, F. Zur Ätiologie der Feldnephritis. [Aetiology of Field Nephritis.] *Med. Klin.* 1944, June 9, v. 40, Nos. 23/24, 334-7.

The author discusses the many views that have been expressed with regard to the cause of field nephritis. He points out that the disease is by no means new, under the name "war nephritis" it was well known in the 1914-18 war. Special mention is made of an observation made at that time by Töpfer to the effect that lice collected from patients often harboured organisms resembling those of typhus fever and trench fever. Töpfer regarded these organisms as the cause of proliferative changes in the capillary endothelium and damage to the kidneys.

The author agrees with the view of REUTER and SCHÄFER [see below] that the cases seen in the late-spring and summer months differ from those occurring in winter, in that the former group tend to occur as epidemics and are often associated with febrile paroxysms of the trench fever type, and enlargement of the spleen.

SCHÄFER, W. & REUTER, A. Verlaufsformen der Feldnephritis. [Different Forms of Field Nephritis.] *Med. Klin.* 1944, June 9 & 23, v. 40, Nos. 23/24 & 25/26, 337-9, 377-81, 4 figs. & 3 charts.

The authors have seen 600 to 800 cases of field nephritis within a year in the northern part of the "Eastern Front" in 1942-43. They were greatly impressed by the great variability of the disease, both in type and in severity. A detailed description is given of three main types, all of which are regarded as being associated with damage to, and increased permeability of, the whole capillary system rather than with special damage to the kidneys.

The commonest type is that in which three cardinal features are present—raised blood pressure, albuminuria, and oedema. The duration was seldom more than one or two weeks, pronounced uraemia was never observed, and there were no deaths. About 40-50 per cent. of the cases belonged to this group.

In the second type, one or two of the above cardinal features were absent and doubt often arose whether these cases could rightly be classified as field nephritis, especially when oedema was the only sign. About 20 per cent. of the cases were of this type.

The most interesting type was that in which there was evidence of an association with trench fever. Although there were great diagnostic difficulties in many of these cases it was believed that about 30 per cent. of the cases fell into this class. The attack of trench fever often preceded the onset of the disease by several weeks.

The authors have already suggested that war nephritis is one of the forms of trench fever [see this *Bulletin*, 1945, v. 42, 204]. In the present study they have obtained evidence that one type of the disease is caused by *Rickettsia quintana*. [This paper and the one reviewed above are very instructive on the subject of field nephritis, but the impression conveyed by them is that the condition

is a symptom rather than a disease and that it may be a manifestation of various diseases including undetected infections of different kinds.]

John W. D. Megaw

YELLOW FEVER

FOX J P The Cultivation of Yellow Fever Virus. I Factors influencing the Multiplication of 17D Virus in Tissue Culture. *Amer J Hyg* 1947 July v 46 No 1 1-20 3 figs. [38 refs.]

Various workers have studied some of the factors which influence the growth of yellow fever virus in tissue culture. Fox has undertaken further experiments in an effort to define these factors more clearly in relation to the growth of the attenuated culture-adapted 17D strain in cultures of minced 10-day-old chick embryos.

The relation between the concentration of virus in the tissue and in the fluid components was relatively constant over a 4-day period the concentration in the tissue being approximately 100 times that in the supernatant.

Virus was cultivated for 40 days in one series and for 20 days in a second series of clot case cultures with the use of a supernatant rich in embryo extract which was partially renewed three times a week.

In studying the type of tissue which would support maximum growth tissue growth was not observed in cultures of chick-embryo brain but stained smears suggested that the cells remained viable during the period of cultivation. Both tissue growth and changes in pH were observed in cultures of whole chick embryo or embryo without the nervous system. In all instances the maximum tissue growth and the lowest pH were reached in 3 days the greatest proportional change occurring during the first 48 hours. It was during this period that the greatest multiplication of virus usually occurred.

When serum in 50 per cent concentration is used tissue proliferation and thus virus multiplication are retarded.

Within rather narrow limits an increase in the amount of tissue resulted in an increase in the amount of virus produced in tissue culture and above these limits a continued increase in tissue prejudiced virus multiplication.

It has been shown that the stability of yellow fever virus is relatively constant over the usual range of pH encountered in tissue cultures.

Maximum titres were essentially the same with all the inocula but the time at which they were attained varied with the size of the inoculum being significantly delayed when very small doses of virus were used.

The optimal range of temperature for incubation of cultures was found to be from 32.5 to 37°C.

It was found that cultures could be prepared in advance and stored at 5°C for at least 11 days prior to inoculation without seriously impairing their usefulness for the cultivation of virus.

F O MacCallum.

FOX J P & LAEMMERT H W Jr The Cultivation of Yellow Fever Virus II Observations on the Infection of Developing Chick Embryos. *Amer J Hyg* 1947 July v 46 No 1 21-40 2 figs. [52 refs.]

When inoculated on to the chorio-allantoic membrane of 7-day-old embryos yellow fever virus multiplied rapidly at the site of inoculation was found in blood at 12 hours and at 24 hours in whole embryo brain and liver with maximum virus concentration on the fourth day.

Virus persisted in the tissues until hatching and was found in the blood of about half the hatched chicks. Antibodies were found 30 days later only in those chicks whose blood had been found to contain virus. Resistance to the virus increased with age at inoculation and embryos 13 days or older when inoculated, hatched nearly as well as uninfected controls.

The principal histological findings were the irregular occurrence of focal necrosis in the muscles and an increase in foci of myelopoiesis. Virus multiplication in embryos, as in tissue cultures, was related to the dose of virus and the temperature at incubation. Higher concentrations of virus were found in embryos infected when under 10 days old.

Relatively large amounts of virus were required to infect by the allantoic or yolk sac routes or when unmodified virus strains were used. It was found that development of infection was more closely dependent upon the concentration of virus to which the cells were exposed than upon the number of cells so exposed.

One of the most important observations was that prolonged embryo-to-embryo passage of strain 17D, and the French neurotropic strains, failed to reveal significant changes in character of virus.

As well as the 17D strain, which appeared after many attempts at attenuation of the pantropic virus, PENNA and MOUSSARCHÉ reported in 1939 [this *Bulletin*, 1940, v. 37, 558], that continued embryo passage had resulted in attenuation of the Asibi strain. It is interesting to note that Penna has informed Fox that several attempts to repeat the attenuation of Asibi virus have been unsuccessful. It would seem that the factor governing the production of these valuable variants is still a mystery.

F. O. MacCallum.

PELTIER. Control of Anti-Yellow-Fever Vaccine from the Pasteur Institute at Dakar by the Quarantine Commission of U.N.E.R.A. and other Questions relating to Yellow Fever. *Bull. Office Internat. d'Hyg. Publique*, 1946, Oct.-Nov.-Dec., v. 38, Nos 10-11-12, 820-23. [French version 616-19.] See this *Bulletin*, 1946, v. 43, 1135.

CERQUEIRA, N. L. & LANE, J. Note on *Haemagogus capricornii* Lutz, 1904 (Diptera, Culicidae). *Proc. Entom. Soc. Washington*, 1945, Dec., v. 47, No. 9, 279-88, 10 figs.

Mosquitoes of the genus *Haemagogus* are important as transmitters of the virus of yellow fever in the forests of Tropical America. The present paper is a contribution to exact systematics and the authors review that subject with particular relation to *H. capricorni*, of which the type locality was near the city of São Paulo, Brazil. They describe with figures the male, female, pupa and larva of a species which occurs in the type locality and which they believe is identical with *H. capricorni* of Lutz 1904.

P. A. Buxton.

PLAGUE.

ROUSSELOT, R. Les rongeurs de la région de Tehran. [Rodents of the Teheran Area.] *Arch. Inst. d'Hessareh. Teheran*, 1947, May, No. 5, 51-61, 7 figs. on 1 pl.

YANG, C. S. Some Notes and Comments on the "Black Death." *Chinese Med. J.* Shanghai, 1947, Jan.-Feb., v. 65, Nos 1/2, 31-6, 1 fig.

LAZARUS A S & GUNNISON J B The Action of *Pasteurella pestis* Bacteriophage on Strains of *Pasteurella Salmonella* and *Shigella* *J Bacteriology* 1947 June 1 53 No 6 705-14 [15 refs.]

Bacteriophage action is not absolutely specific and as one might expect may be related to the composition of the bacterial antigenic mosaic. A large batch of *P. pestis* phage was prepared and called the parent strain. A further careful purification of this phage provided the purified phage.

One of the difficulties of diagnosis of plague bacteriologically has been a liability to confuse *P. pestis* with *P. pseudotuberculosis*. In the present study 27 strains of *P. pseudotuberculosis* were tested for sensitivity to the *P. pestis* phages. Differentiation was possible in most cases but not to such a degree as to make this test sufficiently reliable for isolation. The problem of specificity

and yet 3 out of 42 strains of the former and 6 out of 37 of the latter were

distribution of surface somatic antigens and this finding is supported by these studies
W F Harvey

PRINCE F M & WAYSON N E Addendum to Plague—the Survival of the Infection in Fleas or Hibernating Ground Squirrels. *Pub Health Rep* Wash 1947 Aug 8 62 No 32 1167-8

The experiment with ground squirrels (*Citellus richardsoni*) and fleas (*Diomedus moritatus*) [see this Bulletin 1947 1 44 816] has been repeated with *Citellus torridus* and the same species of fleas. Experiment No 1 was set up with 4 squirrels inoculated intracutaneously with *P. pestis* and having 50 normal fleas on each squirrel. After hibernation for 4 months one squirrel developed

infected with plague and one of these placed on a rat produced plague buboes in the latter. Thus it may be concluded that a squirrel in whose skin plague

W F Harvey

ELISHEWITZ H Epidemic Control with DDT, ANTU and 1080 *Soap* New York 1947 May & June 1 23 Nos 5 & 6 127-9 151 153-9 193 [18 refs.]

Detailed instructions are given for controlling epidemics of plague or murine typhus by attacking both the insect vector and the rodent reservoir. The fleas are destroyed first before the rats to prevent their migration from dead rats

The rats are subsequently destroyed by poison baiting with "ANTU" (alpha naphtha thio-urea) or "1080" (sodium fluoracetate). The former is prepared in 1 to 2 per cent. concentration in a variety of bait formulae and sprinkled over food or water surfaces. It is the material of choice where, *R. norvegicus* is the pest and where there is danger of poisoning children or animals. "1080" is a far more powerful poison, in fact one of the most toxic substances known. It should only be used by skilled operators, where the rodents are not Norway rats, and where there is no risk of poisoning other mammals.

For the protection of field workers, the underwear can be impregnated with 2 per cent. by weight of DDT, or the trouser-legs or puttees, etc., can be sprayed with modern synthetic insect repellents.

J. R. Busvine.

CHOLERA.

PETERSON, J. S. Epidemiological Studies in Cholera. I. Sulfadiazine Prophylaxis against Cholera. II. Duration of the Convalescent Carrier Period in Cholera. III. Secondary Attack Rate among Cholera Household Contacts, China, 1946. IV. Occupation, Age, Sex, Secondary Cases, Vaccination, Case Fatality, *Chinese Med. J.* Shanghai Edition. 1946, Sept.-Oct., v. 64, Nos. 9/10, 271-5; 276-84, 4 figs.; 285-8; 289-95.

I.
grou
and
of the appropriate group in doses of 1 gm. for five days. The two groups consisted of 2,205 persons adequately treated and a control group of 2,563 persons. There were, however, only two cases of cholera in the treated group and eleven in the control: these results certainly suggest the possibility of sulpbadiazine being a true prophylactic, but as the author declares: "Conclusions can be no more than tentative from such material".

II. The problem of the chronic carrier has not been regarded as of the same importance in cholera as in the enteric fevers. During June, July and August, an outbreak of cholera in Shanghai furnished 4,500 cases of bacteriologically proven cholera. A number of statistical tables and charts are given of the results obtained, from which we learn that of 1,949 patients whose stools showed conversion from positive to negative culture, the peak was reached on the 6th day or, nearly equally, for the 4th, 5th and 6th days. One patient continued on the positive list to the 17th day, but none thereafter. "The average number of days it took for conversion (onset of symptoms to first negative culture) was 5.4 with a standard deviation of ± 2.3 ".

III. Statistics of the kind set out in this communication are inevitably dependent on factors known to be exceedingly inaccurate. It is best to take the author's statement, that the comparison is not strictly valid and, indeed, is speculative, as very true. Real totals of the population at risk, weighting of sub-populations with deaths, etc., are well known as factors in causing wide divergence of ratios. We may take the deductions made as first approximations and the nearness of the approximation as very dubious. "The ratio . . . of the attack rate for general population compared to that for household contacts would appear to be . . . 1/36 at the most and probably even less". It is almost to be expected that attack rates among the unvaccinated will be greater than among the vaccinated in these contacts, in this case they were 5.6 times as great. What is probably true is that fatality rates show little difference between vaccinated and unvaccinated.

IV The tables given in this fourth part of the article are careful and such as should accompany all epidemiological statistics. Very wisely the author concludes that these observations are made without too much comment because the material itself is not too reliable and because it is felt that comment should come only after further study of the subject " W. F. Harvey

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

DELAHATER J N & HALLMAN F A Studies on the Culture of *Erdamoeba histolytica* *Proc Soc Exper Biol & Med* 1947, May, v 65, No 1, 26-9

With the view to determining the essential growth factors for *Entamoeba histolytica* the authors have devised a simplified medium consisting of (a) a

cent saline for 24 hours. Cultures of *E. histolytica* in various combinations of these constituents were grown in the presence of a bacterial flora comprising a diphtheroid *Staphylococcus aureus* *Bact coli* a gamma streptococcus and a Gram variable branching bacillus which has not been identified. The authors have demonstrated that the protein free fraction of human serum contains a heat stable (100°C. for 4 hours) dialysable substance which is essential for the growth of *E. histolytica* in egg white buffer infusion medium containing starch. It was also found that partially deproteinized filtrate of human serum diluted in an equal volume of the buffer with addition of starch represents a simple medium for the cultivation of the amoeba. Rice starch appears to have an inhibitory effect on bacterial multiplication resulting in better growth of the amoebae

C A Hoare

BALAMUTH W Improved Egg Yolk Infusion for Cultivation of *Entamoeba histolytica* and other Intestinal Protozoa. *Amer J Clin Path* 1946, June, v 16 No 6 380-84

The author describes a standard and medium for the cultivation of *E. histolytica*

yolk are mixed with an equal amount of distilled water and 125 cc. of 0.8 per cent solution of NaCl are added to the mixture, which is then stirred vigorously with a rotary beater. (2) The mixture is heated in a covered double-boiler for 20 minutes after the temperature of the infusion has reached 80°C. After heating loss by evaporation is compensated by addition of distilled water. The product is then filtered by expression through muslin, the average yield being 125 cc. brought up to 125 cc. by addition of distilled water. The extract is then autoclaved at 15 lb. pressure. A yellowish sediment separates from the

transparent fluid. (5) The extract is cleared by cooling it below 10°C .; this may be followed by filtration with suction through a Buchner funnel, by means of a medium grade filter paper (Whatman No. 2), but the latter process is not essential. (6) To the filtrate is added an equal volume of M/15 potassium phosphate buffer adjusted to pH $7.5 \pm$. (7) Powdered Wilson liver concentrate (or Lilly's liver extract) 1-20 in concentration of 0.5 per cent. is added to the buffered infusion. Liver extract ensures a more rapid growth and is employed chiefly for use in clinical diagnosis but is not necessary for the maintenance of stock cultures. (8) The medium is finally autoclaved in tall test tubes and is stored in the refrigerator until required, when it is dispensed into ordinary test-tubes in amounts of from 7 to 10 cc. Before inoculation a loopful of sterile rice starch is added to each tube. The final reaction of the medium is about pH 7.3.

The author further discusses the effects of varying the conditions of cultivation and of modifications in the constituents of the medium. It was found that medium prepared from white alone.

for the stan. Though the concentration of yolk recommended in this paper proved to be the most efficient, growth of *E. histolytica* was also obtained in media containing half and twice the usual concentration of yolk. It is noted that the standard medium contains the requisite kinds and amounts of inorganic ions, some of which (sodium, potassium, chlorides and phosphates) are introduced in the form of salts, while calcium is derived from the yolk. As regards the reaction of the medium, *E. histolytica* grows in the range from pH 6 to pH 7.6, but experience has shown that when cultivated from stools the amoebae thrive best in competition with the accompanying bacterial flora, when the reaction is neutral or slightly alkaline.

Though primarily adapted for the cultivation of *E. histolytica*, the new medium is also suitable for other intestinal protozoa, e.g. *Entamoeba coli*, *Dientamoeba*, *Endolimax*, *Iodamoeba*, *Trichomonas* and *Chilomastix*.

C. A. Hoare.

FAUST, E. C.
In Cul
Endan
v. 63, No. 2, 210-16.

L. Differences
man Strains of
d. 1946, Nov.,

The authors have made a study of *E. histolytica* with the object of determining the correlation

its, one was a symptomless carrier, Cultures were grown in a medium with solid egg-slant covered with saline containing 0.5 per cent. liver extract, to which rice starch was added. Infectivity and pathogenicity were tested by inoculation of kittens, the results being assessed on clinical evidence and at autopsy. Of the 18 strains, 6 proved difficult to grow in culture; and 4 of these were unsuitable for animal inoculation. All the other strains were grown successfully in culture and, except two of them, produced experimental infections in kittens. The results of these tests showed that culturability, infectivity and pathogenicity are not necessarily correlated with each other, but represent three separate attributes of *E. histolytica*. Thus, there may be difficulty in establishing an infection in kittens with strains growing readily in culture, or a highly pathogenic strain has a low degree of culturability. Furthermore the infectivity of a strain for kittens is not always correlated with symptoms and lesions; thus, strains with low infectivity proved to be highly

pathogenic while very infective strains produced slight lesions. Moreover the clinical symptoms in the experimental host did not coincide with the extent of damage revealed *post mortem*. From this and other studies of the same kind it is evident that further investigations are required to determine the factors which are responsible for the development of the parasite *in vivo* and *in vitro*.

C. A. Hoare

BEMER, A. V. Supra-Vital Staining of Amoebae and some Observations on the Laboratory Diagnosis. *South African Medical Journal* 1947 Vol. 9 No. 21 No. 15
p. 60-64 11 ref.

Prompted by the realization that the diagnosis of amoebiasis often presents great difficulty, recourse has been had to a supra vital staining method to facilitate identification of amoebae. A method of obtaining a satisfactory specimen is outlined as follows — a saline purge of magnesium sulphate is given at 7 a.m. Should an unsatisfactory result be secured a second and larger dose on the following day will succeed. Chemical irritants and oils must be avoided.

With the object of overcoming difficulties in the differentiation of amoebae and cysts the following supra vital staining method was devised —

Solution A	
Brilliant cresyl blue	0.2 gm
Sodium citrate	1.1 gm
Sodium chloride	0.53 gm
Hydrarg perchlor (sat sol)	0.1 cc
Water	100 cc
Solution B	
Eosin	1 gm
Normal saline	100 cc

Equal quantities are mixed and one loopful of the mixture is added to a suspension of faeces on a slide.

Amoebae and flagellates in the living state appear as clear translucent pale blue-green objects against a pink background. Motility is unimpaired. Dead amoebae and flagellates take up the pink stain and the nuclei become quite distinct. By increasing the proportion of solution A it can be shown that *E. histolytica* absorbs particles of cresyl blue.

For fixed film preparation, good results are obtained by a modification of Schaudinn's method in which solutions A and B are used in place of iron haematoxylin. The details of this modification are described.

T. M. H.

With airtight warm stage can be improvised by pinning a cloth or duster around the draw tube of the microscope above the coarse adjustment rack and draping the cloth over the lower part of the microscope and lamp (80 kilowatt). By these means some specimens of *E. histolytica* remain motile after 36 hours when in wet preparations treated with vital stain despite the presence of mercuric chloride in the stain.

P. Mansoor Bahr

ROBERTSON, K. M. Acute Amoebiasis complicating Cholecystectomy. Report of a Case. *Lancet* 1947 Sept. 6 355-6

The patient was a 35-year-old male, who had been ill for 10 years previously with a long history of abdominal pain and diarrhoea. He had been treated with various drugs, including opium, but had not improved. On admission to hospital he was found to have a large, tender, and inflamed appendix, which was removed at operation. The post-operative course was unremarkable, and the patient was discharged on the 10th day.

Since the operation for appendicitis the patient had been in excellent health: he was not aware of any previous dysentery, but occasionally suffered from short attacks of diarrhoea, usually lasting only one day.

In September 1946, he was admitted to hospital for cholecystectomy for symptomless calculi, in view of his pending return to Africa. At operation, gallstones and biliary sand were found, the fundus of the gall-bladder was buried for about an inch in liver substance and its removal required a small incision into the liver tissue; the resulting small cavity was carbolyzed before being closed. The liver and all the colon seen were apparently normal.

The patient progressed well until the morning of the fourth day, when he had several loose stools. His temperature rose to 100°F. and thereafter bowel action increased in urgency, and the temperature continued to rise. Several examinations of stools for amoebae and cysts were negative and blood slides were negative for malaria. The white cells were 14,000 per cmm., with a relative increase of polymorphs.

The patient became rapidly more ill, and ascites developed, with a tender abdomen. The diarrhoea resisted full doses of succinyl sulphathiazole. No signs of suppuration could be found, though the rectal wall felt indurated and painful.

The abdomen was re-explored through the original wound: no subphrenic or pelvic suppuration was found, but much bloodstained fluid escaped from the peritoneal cavity. It was found that the colon was intensely inflamed and thickened, especially in the ascending colon and hepatic flexure; the gut was accidentally torn in this region during exploration. Microscopical examination of the escaping fluid showed a large number of *E. histolytica* trophozoites. The patient was given transference for four days.

Emetine was given in 1 grain doses every 12 hours for three doses, and subsequently daily until 12 grains had been given. Penicillin in 100,000 unit quantities was injected every 3 hours for a week. The patient remained very ill until the end of the week and then recovered steadily. As soon as fluids were allowed by mouth, he was given 8 gm. of succinyl sulphathiazole every 8 hours.

After the emetine injections, E.B.I. was given, followed by a course of carbarsone. The patient, who had developed a small faecal fistula which has since healed, has shown no further evidence of residual dysenteric infection.

The author comments that a "cold" cholecystectomy seems to have caused a flare-up of an unsuspected amoebiasis. It is suggested that the complication

appear in any abdominal operation.

H. J. O'D. Burke-Gaffney.

JONES, W. R. The Therapeutic Action of some Known Amoebicides in Rats. *Brit. J. Pharmacol.* 1947, Sept., v. 2, No. 3, 217-20, 3 figs.

The author has recently described a test for amoebicides in which rats are inoculated intracaecally with cultures of *E. histolytica* [this *Bulletin*, 1947, v. 44, 313]. After treatment with drugs, the degree of infection is assessed in control and treated animals. With the same technique he has now compared the amoebicidal activity of emetine, stovarsol, carbarsone, chiniofon and diodoquin, drugs which have been used with success in clinical practice. Such comparative tests should be useful in screening new chemotherapeutic agents. The drugs were given in one schedule, orally in a single dose 24 hours after infection and, in the other, in multiple doses at intervals of 24, 30, 48, 54, and

17 Departments of Colombia in Santander with 1 052 cases Boyaca with 954, Cundinamarca with 497 fleas are recorded as very numerous in North Santander with 236 as numerous in others with 108 or less they are scarce (vi) Do other insects play a part in the transmission of leprosy? Ticks lice mites bugs Simuliidae other diptera and flies are discussed briefly with references to the literature but no first hand evidence is adduced (vii) On acid fast bacilli and attempts to cultivate them from the soil and from flea larvae in dwellings inhabited by lepers Remarks are made on certain organisms thus cultivated

This article is of interest as a further study tending to incriminate the human flea *P. irritans* as a if not the vector of *Mycobacterium leprae* Worthy of note also is the statement of Dr Juan de D CARRASQUILLA who in 1905 wrote Leprosy is not contagious in the same way as diseases such as small pox it is infective and the agent is the flea (La lepra no es contagiosa a la manera de otras enfermedades como la viruela es infectiva y el agente de infección es la pulga) H Harold Scott

RUSSELL C S C Cultura cromogénica de um bacilo ácido álcool resistente isolado do mosquito (Culicoides) capturado sobre leproso em plena natureza com rétrocultura obtida de rato branco [Culture of an Acid-Fast Bacillus from a Mosquito caught on a Leprosy Patient, with Subculture from a White Rat] *Mem Inst Oswaldo Cruz* 1946 Sept v 44 No 3 413-24 7 figs

DE SOUZA ARAUJO H C Clamp Method to obtain Cutaneous Lymph in the Diagnosis of Leprosy *Leprosy Review* 1947 Apr-July v 18 Nos 2/3 44-5

The author describes a modification of the Lleras method of obtaining skin lymph which he has used successfully in Brazil

vaccination pen The slide should be covered and left to dry for a few hours obtaining

can ps are used

stocks two

In diffuse lepromatous lesions enormous numbers of acid fast organisms

General control of treatment and parole

H J O D Burke Gaffney

DE OLIVEIRA CASTRO G M Staining Nodules of the Leprosy Bacillus *Leprosy Review* 1947 Apr-July v 18 Nos 2/3 45 9 2 figs

The author uses the term bacilli nodules or nodules for the rounded spore like thickenings seen in lepra bacilli an unfortunate term His method is a modification of that of Cooper in which the addition of sodium chloride to a solution of carbol fuchsin produces a precipitate at room temperature which is added to 100 cc of Flood the slide with

this stain, steam for five minutes and allow to cool until a cloudy precipitate of the stain appears, and pour off the stain. Without washing, decolorize in 3 cc. HCl in 97 cc. of 96 per cent. ethyl alcohol until the dye ceases to flow off. Counter-stain for half to one minute with a dilute solution of 0.1 gm. methylene blue in 1,000 cc. water. Wash and dry. The acid-fast bacilli are stained red and the "nodules" within them stain very dark red or brown, as spherical structures of a larger size than the bacilli; they may be at the ends of the bacilli and usually number 1 to 3 and rarely exceed 4 or 5. They are present in practically all the bacilli. Similar results are obtained by staining tubercle bacilli in spufum

L. Rogers.

Muir, E. Classification of Leprosy Cases. *Leprosy Review*. 1947, Apr.-July, v. 18, Nos. 2-3, 73-82, 1 diagram.

The importance of a general adoption of a sound classification of leprosy cases is stressed and the South American division into the two characteristic lepromatous and tuberculoid types—together with a third uncharacteristic chronic inflammatory one, which may later develop into one of the typical ones—is discussed and illustrated by a diagram. This represents a doorway below into the intermediate uncharacteristic form, which leads off laterally into lepromatous on one side and tuberculoid on the other. The well-recognized microscopic characters of the typical forms and the positive lepromin test in tuberculoid and negative ones in lepromatous cases is stressed. The third intermediate type is subdivided (a) initial, in the course of passing into one of the typical forms; (b) intermediate, passing from one of the characteristic types into the other; or (c) vestigial, passing out of one of the characteristic types on the way towards recovery. The chief indication of an uncharacteristic two types.

of the skin of
n. Bacilli are

few or nil in them and the lepromin test negative or moderately positive, while they rarely show a reactionary phase. The author holds that tuberculoid cases may be transformed into lepromatous ones, but only infrequently. The reverse change is of more doubtful occurrence. The paper concludes with a list of points to be noted in making a clinical examination, together with forms for case taking, which should be read in full by those interested. L. Rogers.

COCHRANE, R. G. Child Leprosy. *Leprosy Review*. 1947, Apr.-July, v. 18, Nos. 2/3, 49-53.

This article was written for a special number of *Leprosy Review*, in connexion with the retirement of Dr. E. Muir. After paying tribute to the long and valuable work of Muir, the author records once more his well-known views on child leprosy and states that he is in agreement with early emphasis laid on the importance of the subject by Rogers and by Muir. Only a certain amount of child leprosy is serious from the preventive aspect in South India, for a significant proportion of cases are benign and non-progressive. Practical consideration need only be given to (1) Simple neural leprosy, and (2) Pre-lepromatous lesions, the latter comprising perhaps only five to ten per cent. of all child cases, which develop into lepromatous leprosy late in life and mostly arise in families where there is the closest contact from early life with open cases. These cases require closer attention in order effectively to control them. He thinks that the corium of the skin is the site of active development of lepra bacilli and that those in the reticulo-endothelial system are mainly saprophytes living in a state

of commensalism. The benign cases in children do not require prolonged treatment but every effort should be made to prevent the occurrence of deformities
L. Rogers

PARDO-CASTELLO V, TIANI F R & PIÑEYRO R. Nerve-Lesions of Leprosy.
Arch Dermat & Syph 1947 June v 53 No 6 783-9 5 figs

The pathological and bacteriological aspects of leprosy as it affects the peripheral nerves is dealt with. In a previous paper the authors [this *Bulletin* 1943 v 40 785] insisted on the presence of nerve lesions in almost every case of leprosy and on the importance of distinguishing the lepromatous from the tuberculoid type of the lesions of

In lepromatous cases the extensive skin lesions are accompanied by clinical involvement of the peripheral nerves. In tuberculoid cases the skin lesions are accompanied by clinical involvement of the peripheral nerves.

the other hand in tuberculoid cases both peripheral and trunk nerves show thick infiltrations of lymphocytes epithelioid and giant cells but few or no lepra bacilli as in tuberculoid lesions of the skin. Caseation or abscess formation may result with complete destruction of the neural tissues. The authors are therefore of the opinion that the so-called neural leprosy belongs to the

L. Rogers

MOM A M. Benadryl en la reacción leptosa lepromatosa y en la sensibilización sulfónica [Benadryl in the Treatment of the Leprous Reaction] *Rev Argentina Dermatosisifilologia* 1947 June v 31 No 2 188-91

Allergic reactions of which the leprous reaction is one are due, it is said, to a substance closely allied to histamine probably identical with it. It is argued therefore that the leprous reaction may be modified or even nullified by synthetic anti-histamine substances. Benadryl the hydro-chloride of benzhydryl diethylaminoethyle ether has therefore been tried in six cases of the lepromatous form with the leprous reaction. Two were women 22 and 24 years of age and four were men between 24 and 42 years and all were moderate cases of 1½ to 8 years evolution. Each of these received 150-200 mgm of Benadryl daily.

Upous leprous Benadryl also counteracts sensitivity to sulphonamide drugs relieving the pruritus urticaria and other rashes. It is to be noted that all the patients had the lepromatous type of the disease.
H. Harold Scott

COCHRANE, R. G. 'Sulphone Treatment of Leprosy. [Correspondence.] *Brit. Med. J.* 1947, July 19, 110-11.

This letter is written to protest against "a tendency for treatment to receive precedence over prevention" and to sound a warning note against the belief, apparently held in some quarters, that "the leprosy problem could be solved by curative measures alone." [The author does not indicate who holds such a view, nor can the reviewer think of one such in his extensive acquaintance with the literature.] The author goes on to state the well-known facts that promin is toxic and diasone may produce reactions, so both should only be used at present under carefully controlled conditions. He further states that sulphetrone is the least toxic of this class of drugs, but that it is not likely to be on the market for some time.

L. Rogers.

PEYRI, A. La lepra en Monterrey. Datos y comentarios. La diaminodifenil-sulfona en cinco casos. [Leprosy in Monterrey. Treatment by Diaminodiphenyl Sulphone (Promin).] *Sugestiones*. Mexico. 1947, June, v. 12, No. 142, 22-41. 2 maps.

Monterrey is a town of Nuevo León, a province of Mexico. The author, who is a professor of the Nuevo León University, tells of his experience of leprosy after 5 years' residence. Nuevo Leon has a population of 541,147 and the total number of leprosy cases seen in the five years, 1939-44, is given as 44, or 0.8 per mille. Figures are given of previous censuses of the country. In 1927, among 15,151,695 inhabitants there were 1,450 registered cases of leprosy, 22 in Nuevo León; in the quinquennium 1930-34 there were 249 registered, 52 in Nuevo León; between 1935 and 1938 a total of 2,696, of which 14 were in Nuevo León; in the five-year period 1939-44, there were 1,988 registered, 44 in Nuevo León, as stated above.

The author has no reliable data on the prevalence in Monterrey itself. There has been no register kept, nor clinical histories at the hospital, although on several occasions leprosy patients have been admitted, and he says "I have gathered from a nurse that in 8 years there have been some 10 or 12 patients." He, therefore, limits his remarks to 30 cases which he has had under his personal care and he estimates [? guesses] that the total in Monterrey during the five years is 50. Of his 30, 17 were males, 13 females: two were under 10 years of age and the numbers in succeeding decades were 4, 7, 7, 6 and 4. Five were married, but in no instance were husband and wife both infected, and none of the 30 was aware of having lived with a leper or resided in a focus of high endemicity; most lived in the country and were not overcrowded. Of his 30, sixteen were of the lepromatous form, four were tuberculoid and ten "not characteristic". [Later he states "17 were lepromatous, 13 neural".] Their environment, sanitarily, was deplorable; there is no control at all, they do what they like where they like, they wander about unchecked, cross the frontiers and recross them unquestioned.

The first symptom noted was hypochromic blotches (5), nodules (5), patches of anaesthesia (5), epistaxis (4), and other signs in smaller numbers. To five of the patients, the author gave diaminodiphenyl sulphone (DDS) [Promin] intravenously, in doses of 2 gm. daily for six days in the week, with an interval of 15 days every two months. In all of them there was improvement after a total dosage of 200-300 gm.; in two, bacteria were no longer found, but the drug did not prevent the appearance of a leprous reaction.

H. Harold Scott.

HELMINTHIASIS

TALICE, R. V. Pseudoparasitismo en gastroenterología. [Pseudoparasitism in Gastro-enterology.] *Ar Facul de Med Montevideo* 1947, v. 32, Nos 1-2-3-4 1-24 36 figs

The uninformed laity are repeatedly bringing to medical men specimens of faeces or substances taken therefrom which they think are parasites passed in their stools, and fear that they are harbouring others. Some of these are so like parasites that at first view they "may deceive even the very expert." The

reply perusal. The author divides them into two main groups: macroscopic and microscopic and subdivides each again into those of animal nature, those of vegetal nature and those of human intestinal origin. Among the first

of cotton which have been inadvertently swallowed. The third subdivision would include rolled masses of mucus in mucous colitis, or membranous fragments in mucomembranous colitis.

Of microscopic pseudoparasites he mentions acarnes, *Tyroglyphus* flour mites and cysts in the liver of parasitized sardines; of the second subgroup, epidermal residues of fruits, spores of moulds parasitic on vegetables and fruits, yeasts etc. Of human origin leucocytes and mucosal cells mistaken for amoebae (a mistake with which all teachers of tropical pathology and parasitology are constantly confronted by students). H. Harold Scott

JACQUES J. J. C. Effets d'une cure de vingt grammes de sulfamides per os "sur les verminoses intestinales de l'indigène." [Treatment of Intestinal Worms in Africans with Twenty Grammes of Sulphonamides.] *Ann Soc Belge de Méd Trop* 1947 Mar 31 v. 27 No 1 83-4

The treatment was without effect.

RHODESIA SOUTHERN DEPARTMENT OF PUBLIC HEALTH Salisbury. Pamphlet No 2 (Amended 1947) 9 pp 3 pls. The Story of Schistosomiasis ("Bilharziasis") and how to combat it.

This pamphlet is evidently written for laymen and presents in very lucid form the important facts concerning parasites, snails, symptoms, and measures of prevention in relation to infection with *S. haematobium* and *S. mansoni*. In Southern Rhodesia both infections are common; the snail hosts are *Physopsis africana* and *Planorbis pfeifferi* respectively. Prevention is dealt with under several heads:—Treatment of infected persons, Prevention of stream contamination, Killing of snails, Killing of cercariae, and Avoidance of contact with infested water.

It is a good pamphlet, which will appeal to intelligent people. Medical men in other countries in which these diseases occur may be interested to see how the subject is presented.

Charles Wilcocks.

IGNACIO BALDO, J., GIL YEPEZ, C., MAYER, M. & PIFANO C., F. Investigaciones concernientes a los aspectos pulmonar y cardiovascular de la Schistosomiasis Mansonii en una area endémica del país. [Pulmonary and Cardio-vascular Lesions in Infestations with *Schistosoma mansonii* in an Endemic Area.] XII Conferencia Sanitaria Panamericana. Cuadernos Amarillos. Publicaciones de la Comisión Organizadora. No. 9. Caracas. 1946. 68 pp., 9 figs. [21 refs.]

That pulmonary symptoms, due to the passage of metacercariae or to embolism by ova, occur in infestation with *S. mansonii* is a fact well known, and radiology demonstrates shadows of an exudative type, fleeting infiltrations, miliary broncho-pneumonia, especially in the early days of infestation and disappearing in a short time. Later, there may be larger, isolated granulations due to the presence of adult worms, or the ova, coalescing to form nodules, "Bilharzioma" with
lioid cells and fibrotic with
fibrinous or sero-fibrin ctasis

The author decided to look into these matters more thoroughly and accordingly undertook to examine the lungs of children and persons under 20 years of age in an endemic area of schistosomiasis in Venezuela. The age was limited with a view to excluding conditions common in adults over that age. For cardiac changes children only were selected in order to exclude rheumatism, syphilis, etc., common in older persons. It is stated that tuberculous infection rate is high in the country; in the towns, 50 per cent. of those under 15 years react positively to tuberculin.

The district chosen was San Casimiro, through which run the rivers Gueripa, Toronquey and Suata and where cercarial dermatitis, "pica-pica", is common.

165 were positive, 21 doubtful, and recorded as 186, or 54.7 per cent., positive; it was highest, 18 positive and 2 doubtful, among 24 rural schoolchildren. Only 156 faecal examinations were carried out (by Stoll's method); of 42 town-dwellers [? adults] 21 were positive, of 81 children attending town schools 28 were positive, and 15 of 33 attending rural schools. Other infestations, as by *Ascaris*, *Trichuris* and *Necator* were common; *Taenia* less so.

Of 179 chests radiologically examined [another 9 screened are not discussed], 97 were normal, 82 showed some change: lungs "atypical" in 48, small nodules in 11, residual pleurisy in 4; but three of the last and several of the former gave a positive tuberculin reaction.

Cardiac enlargement was seen by X-rays in 28; in 11 a general enlargement, in 6 enlargement of the left side, in 9 of the right, and in 2 a "globular heart". Clinically, it is said, the findings were of little importance, but dyspnoea and palpitation on slight exertion were common, with accentuation of the pulmonary second sound. The lesion was considered to be of the nature of a myocarditis. [Reproductions of the X-ray photographs are given, but are printed too darkly to be very informative.]

H. Harold Scott.

RITCHIE J & HANTON F Herpes Zoster A Toxic Manifestation resulting from the Therapeutic Administration of Antimony and Potassium Tartrate in the Treatment of Schistosomiasis *Clin Proc Cape Town* 1947, June 16 No 4 125 9

Since July 1945 the authors have treated schistosomiasis by the intensive method of ALVES & BLAIR (this *Bulletin* 1945 v 42 815 1946 v 43 344) in preference to the previously used administration of smaller doses over a longer period

In 5 of 105 patients so treated a typical attack of herpes zoster indistinguishable from idiopathic herpes developed between the 5th and the 10th days after completion of treatment no children were affected All patients recovered without sequelae on symptomatic treatment The delayed onset of herpes was not related to the severity of the initial toxic symptoms

was generalized at first Such eruptions were also seen in many cases where herpes did not occur

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his
condition following the administration of antimony The current consensus favours the belief that all herpes zoster is due to a virus and that in symptomatic cases this is activated by the particular factor concerned as the resistance of the nervous tissue is lowered

In view of the similar chemistry of antimony to that of arsenicals which are well known to be followed at times by herpes zoster the occurrence of such a reaction as a result of the administration of antimony is not surprising It is suggested that the virus of herpes zoster is very commonly harboured by man and the infection may result in carriers from any process tending to lower resistance in the spinal ganglia

The authors reviewed some 200 records of treatments of schistosomiasis by the well known routine administration of $\frac{1}{2}$ -2 grains of antimony and potassium tartrate over long periods Only one patient was found in whom herpes zoster had developed during treatment It is therefore suggested that the rapid treatment does render the patient more liable to the development of herpes zoster although the total dosage of antimony is about half of that used in the older method

[See also Arsenical Chickenpox — *Bulletin of Hygiene* 1946 v 21 794]

H J O D Burke-Gaffney

LUTTENOSER G W La campana antibilharziana en Venezuela [The Campaign against *Schistosoma mansoni* Infestation in Venezuela.] *III Conferencia Sanitaria Panamericana Cuadernos Amarillos Publicaciones de la Comisión Organizadora No 12 Caracas* 1946 74 pp 20 figs & 3 folding pls (2 maps) [Bibliography] English summary

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to ... on the streams to dry up water collections temporarily to apply lethal chemicals and to establish adequate latrines From 1941 measures have been more energetically pursued The Ministry of

Health then took up the question in earnest; an anti-bilharzia dispensary was established, an anti-snail campaign inaugurated and later intensified, first in Caracas, then in Guarenas.

The present publication details the means employed in carrying these measures into effect. First comes the laboratory and associated clinic for diagnostic ends; faecal examination by the Stoll technique and, if that proves negative, by a method of sedimentation and examination of the deposit. Other methods used were the intradermo-reaction of Fairley and the fixation of complement and, as a last resort, biopsy of tissue from the rectal ampulla. The clinical syndromes were also studied, groups being divided into hepato-intestinal, hepato-splenic, intestinal, and asymptomatic. Lastly, treatment by tartar emetic in 1-2 per cent. strength injected intravenously in doses of 0.02 gm. upwards till 1.2-1.6 gm. have been given. The patient is then re-examined and, if he is still uncured, the course is repeated. Another preparation used was Fouadin or Reprodal, a trivalent compound containing 6-13 per cent. of antimony.

The endemic zone of schistosomiasis in Venezuela comprises much of the States of Aragua, Carabobo, Miranda and the Federal District—the most thickly populated area (clearly shown in a line map). The morbidity varies enormously in different parts of this area. SCOTT [this *Bulletin*, 1942, v. 39, 865] found, in one district, the faeces of 100 per cent. of women and men and 91 per cent. of the children positive, in others only a few [the percentages are given in a table, but not the numbers on which these figures are based]. The mortality figures do not seem to be reliable; many deaths ascribed by some to this infestation are notified by others as due to complications, the primary condition not appearing in the record. Thus JAFFE stated that 37 per cent. of patients with bilharziasis died as a result of the infestation, while, in 1945, in El Valle only one death per mille was officially notified as due to this disease and it is thought that many more were included under "dysentery".

The Minister of Health, apart from the diagnostic measures mentioned above, has already established dispensaries in Caracas, El Valle and Guarenas. These are not only centres for treatment, but also for propaganda and sanitary education of the people, showing them how the infection is contracted and thus how they can avoid it. Example as well as precept is employed and proper latrines are set up, one particular type of prefabricated latrine is depicted clearly [almost the only clear illustration of the 20]. Chemical treatment of streams and small water collections by sulphate of copper and by slaked lime is detailed, and engineering projects such as proper irrigation, establishment of sewerage systems and protected aqueducts are referred to.

H. Harold Scott.

CUTLER, J. G. Schistosomiasis of the Central Nervous System. *J. Nervous & Mental Disease*. 1946, Oct., v. 104, No. 4, 425-31. [15 refs.]

Before the war only 9 cases of schistosomiasis of the central nervous system were described in the world literature. To this number THOMAS and GAGE

nervous system involvement is reported.

A 23-year-old soldier was exposed to infection on Leyte, between February and July 1945, on several occasions without any immediate ill-effects. On August 5th, he noted swelling of the right eyelids and upper lip, and angioneurotic

oedema was diagnosed. This was followed by progressive weakness of the upper and lower extremities. By August 9th he was unable even to sit up in bed; he appeared confused but answered questions with a slightly slurred speech. His head jerked spasmodically from side to side; there was nystagmus on left deviation. There was a plastic like rigidity of the upper limbs and a flaccid paralysis of the lower with a Babinski on the left. All reflexes were hyperactive except the abdominal which were absent.

The blood showed a high eosinophilia—43 per cent of 22 550 leucocytes, ova of *Schistosoma japonicum* were found in the stools and the lumbar puncture the gold curve and the Wassermann were normal.

It seemed plausible however that an invasion by parasites or ova of the brain stem in its more superficial zones to include the basilar and cerebellar tracts could account for all the neurological findings.

Intramuscular foudadin was started immediately and 75 ml were given in 29 days. Improvement started immediately; after three weeks the patient was able to walk about the wards, with only a slight ataxia. When the patient left hospital 2 months later ova had not been found in the stools for 6 weeks but he still had eosinophilia 38 per cent of 11 000 leucocytes.

Chest X rays were persistently negative but electrocardiograms three weeks after admission and subsequently showed an inverted T2.

The author believes that in this case the first symptoms appeared about 4 to 5 weeks after exposure. He considers that there is evidence that these precede the deposition of ova and that therefore in such cases immediate specific therapy is of vital importance.

L. E. Napier

BERTRAND. Distomatose pulmonaire ou hémoptysie pulmonaire à paragonimus [Pulmonary Distomatosis or Haemoptysis from *Paragonimus*. *Ann Soc Belge de Méd Trop* 1947 Mar 31 v 27 No 1 1-3]

Report of a case in the Belgian Congo

FEDERICO HEINERT J. Paragonimiasis pulmonar o distomatosis pulmonar en el Ecuador [Pulmonary Paragonimiasis in Ecuador]. *Kuba Habana* 1947 May v 3 No 5 101-6. English summary.

Between 1921 and 1946 the first 26 cases of paragonimiasis in Ecuador were studied. The present report is an account of this condition with detailed clinical and pathological records of some of the cases. All except one came from provinces in the Ecuadorian littoral. Eighty per cent of the patients were cured by emetine; the remainder who failed to respond to emetine and tartar emetic required endobronchial treatment.

The author considers that infection was derived from raw or improperly cooked crabs; they also suggest without providing supporting evidence that prawns may have played a part.

H. J. O. D. Burke-Gaffney

FAIV. A. Un cas de sparganose chez l'homme deux cas de sparganose chez le serval et un cas de diphyllbothrose (*D. parvum*) chez le chacal au Congo belge [A Case of Sparganosis in Man, Two Cases of Sparganosis in the Serval and One Case of Sparganosis in the Jackal in the Belgian Congo]. *Ann Soc Belge de Méd Trop* 1947 Mar 31 v 27 No 1, 60-9 1 pl.

A human case of sparganosis was seen in the eastern region of the Belgian Congo. This as far as is known is the first case of its kind reported from that region.

Specimens of *Diphyllobothrium* were also found in a jackal and a serval, these being respectively *D. parvum* and sparganum. [The parasites are illustrated in a photograph.]
H. J. O.D' Burke-Gaffney.

VON BONSDORFF, B. "Castle's Test" in Pernicious Tapeworm Anemia. *Diphyllobothrium latum* and Pernicious Anemia VII. *Acta Med. Scandinavica*. 1947, v. 128, Suppl 196, 456-77, 14 figs. [10 refs.]

The author's earlier work (*Acta Med. Scandinavica*, 1939, v. 100, 436, 459; 1940, v. 105, 540) [see also this *Bulletin*, 1944, v. 41, 593, 594, 678] indicates that the gastric juice of persons suffering from tapeworm pernicious anaemia contains intrinsic factor, so that the anaemia is not due to lack of this substance. Nor is there any evidence that it is due to lack of extrinsic factor. The author suggests the idea that pernicious tapeworm anaemia can be due to interference by the tapeworm with the interaction between the intrinsic and extrinsic factors. The work of HERNBERG [this *Bulletin*, 1937, v. 34, 400; 1941, v. 123, 255] shows that mixtures with tapeworm pernicious anaemia are given to patients with cryptogenetic Addisonian pernicious anaemia. The question whether mixtures of gastric juice and sources of extrinsic factor can cause remissions in patients with tapeworm pernicious anaemia has not yet been studied.

The author carried out Castle's test on 4 cases of cryptogenetic pernicious anaemia and 10 cases of tapeworm pernicious anaemia. These patients were given mixtures of normal gastric juice taken from normal healthy young subjects or from suitable patients after stimulation with 12 to 16 units of insulin given intravenously; and they received extrinsic factor in the form of minced beef or yeast extract. The gastric juice was kept half an hour at pH 10 and then neutralized to conform with the author's studies [*loc. cit.*] of its proteolytic activity at neutral reaction. When it was not used at once, it was frozen and kept in a refrigerator. Each day, 150 to 175 ml. of gastric juice were used for making the mixtures. The source of extrinsic factor for most patients was 150 gm. of lightly roasted minced beef, but some patients received a "watery solution of 60 g. yeast extract". The meat was mixed with the gastric juice, and the pH adjusted to 7-7.4 if necessary. Patients either at once or after incubation for 8 days received the mixtures for 8 days. The basal diet was the usual hospital one, but was rather poor in proteins. Clinical data of the patients are given. The results of the experiments are illustrated by graphs.

Experiment 1 shows a "very powerful" anti-anaemic effect of the non-incubated mixture of gastric juice and beef on a case of cryptogenetic pernicious anaemia, which was not surpassed by the effect of the same mixture after incubation. The other experiments show the effects of feeding, in parallel, patients suffering from cryptogenetic and tapeworm pernicious anaemia with the same preparations of gastric juice and beef, with or without incubation; and of feeding patients suffering from tapeworm pernicious anaemia with mixtures of gastric juice and either beef or yeast extract, but without the parallel cases of cryptogenetic pernicious anaemia.

The author claims that his results provide "clear and indisputable" evidence that in cases of cryptogenetic pernicious anaemia there was a "good remission" after administration of a non-incubated mixture of gastric juice and extrinsic factor; incubation of the mixtures did not strengthen this antianaemic effect. In 7 cases of tapeworm pernicious anaemia the remission was slight or absent,

oedema was diagnosed. This was followed by progressive weakness of the upper and lower extremities. By August 9th he was unable even to sit up in bed—he appeared confused but answered questions with a slightly slurred speech. His head jerked spasmodically from side to side—there was nystagmus on left deviation. There was a plastic like rigidity of the upper limbs and a flaccid paralysis of the lower with a Babinski on the left. All reflexes were hyperactive except the abdominal which were absent.

The blood showed a high eosinophilia—43 per cent of 22,550 leucocytes, ova of *Schistosoma japonicum* were found in the stools and the lumbar puncture—the gold curve and the Wassermann were normal.

It seemed plausible however that an invasion by parasites or ova of the brain stem in its more superficial zones to include the basilar and cerebellar tracts could account for all the neurological findings.

Intramuscular founadin was started immediately and 75 ml were given in 29 days. Improvement started immediately after three weeks the patient was able to walk about the wards, with only a slight ataxia. When the patient left hospital 2 months later ova had not been found in the stools for 6 weeks but he still had eosinophilia 33 per cent of 11,000 leucocytes.

Chest X rays were persistently negative but electrocardiograms three weeks after admission and subsequently showed an inverted T2.

The author believes that in this case the first symptoms appeared about 4 to 5 weeks after exposure. He considers that there is evidence that these precede the deposition of ova and that therefore in such cases immediate specific therapy is of vital importance.

L. E. Napier

BERTRAND Distomatose pulmonaire ou hémoptysie pulmonaire à paragonimus (Pulmonary Distomatosis or Haemoptysis from *Paragonimus*) *Ann Soc Belge de Med Trop* 1947 Mar 31, v 27, No 1, 1-3

Report of a case in the Belgian Congo

FEDERICO HEINERT J. Paragonimiasis pulmonar o distomatosis pulmonar en el Ecuador (Pulmonary Paragonimiasis in Ecuador) *Revista Habana*, 1947 May, v 3, No 5, 101-6. English summary.

Between 1921 and 1946 the first 26 cases of paragonimiasis in Ecuador were studied. The present report is an account of this condition with detailed clinical and pathological records of some of the cases. All except one came from provinces in the Ecuadorian littoral. Eighty per cent of the patients were cured by emetine—the remainder who failed to respond to emetine and tartar emetic required endobronchial treatment.

The author considers that infection was derived from raw or improperly cooked crabs—they also suggest without providing supporting evidence that prawns may have played a part.

H. J. O. D. Burke-Gaffney

FAIN, A. Un cas de sparganose chez l'homme deux cas de sparganose chez le serval et un cas de diphyllorose (*D. farum*) chez le chacal au Congo belge (A Case of Sparganosis in Man, Two Cases of Sparganosis in the Serval and One Case of Sparganosis in the Jackal in the Belgian Congo) *Ann Soc Belge de Med Trop* 1947, Mar 31, v 27, No 1, 65-9, 1 pl.

A human case of sparganosis was seen in the eastern region of the Belgian Congo. This as far as is known is the first case of its kind reported from that region.

Specimens of *Diphyllobothrium* were also found in a jackal and a serval, these being respectively *D. parvum* and *sparganum*. [The parasites are illustrated in a photograph.]
H. J. O. D' Burke-Gaffney.

VON BONSDORFF, B. "Castle's Test" in Pernicious Tapeworm Anemia. *Diphyllobothrium latum* and Pernicious Anemia VII. *Acta Med. Scandinavica*. 1947, v. 128, Suppl. 196, 456-77, 14 figs. [10 refs.]

The author's earlier work (*Acta Med. Scandinavica*, 1939, v. 100, 436, 459; 1940, v. 105, 540) [see also this *Bulletin*, 1944, v. 41, 593, 594, 678] indicates that the gastric juice of persons suffering from tapeworm pernicious anaemia contains intrinsic factor, so that the anaemia is not due to lack of this substance. Nor is there any evidence that it is due to lack of extrinsic factor. The author suggests the idea that pernicious tapeworm anaemia can be due to interference by the tapeworm with the interaction between the intrinsic and extrinsic factors. The work of HERNBERG [this *Bulletin*, 1937, v. 34, 400; see also *Acta Med. Scandinavica*, 1941, v. 123, 255] shows that mixtures of gastric juice with tapeworm pernicious anaemia can be given to patients with cryptogenetic addisonian pernicious anaemia. The question whether mixtures of gastric juice and sources of extrinsic factor can cause remissions in patients with tapeworm pernicious anaemia has not yet been studied.

The author carried out Castle's test on 4 cases of cryptogenetic pernicious anaemia and 10 cases of tapeworm pernicious anaemia. These patients were given mixtures of normal gastric juice taken from normal healthy young subjects or from suitable patients after stimulation with 12 to 16 units of insulin given intravenously; and they received extrinsic factor in the form of minced beef or yeast extract. The gastric juice was kept half an hour at pH 10 and then neutralized to conform with the author's studies [*loc. cit.*] of its proteolytic activity at neutral reaction. When it was not used at once, it was frozen and kept in a refrigerator. Each day, 150 to 175 ml. of gastric juice were used for making the mixtures. The source of extrinsic factor for most patients was 150 gm. of lightly roasted minced beef, but some patients received a "watery solution of 60 g. yeast extract". The meat was mixed with the gastric juice, the mixture was stirred and, after adjustment of the pH to 7-7.4 if necessary, the mixture was given to the patients either at once or after incubation for 6 hours at 37°C. Each patient received the mixtures for 8 days. The basal diet was the usual hospital one, but was rather poor in proteins. Clinical data of the patients are given. The results of the experiments are illustrated by graphs.

Experiment 1 shows a "very powerful" anti-anaemic effect of the non-incubated mixture of gastric juice and beef on a case of cryptogenetic pernicious anaemia, which was not surpassed by the effect of the same mixture after incubation. The other experiments show the effects of feeding, in parallel, patients suffering from cryptogenetic and tapeworm pernicious anaemia with the same preparations of gastric juice and beef, with or without incubation; and of feeding patients suffering from tapeworm pernicious anaemia with mixtures of gastric juice and either beef or yeast extract. The results of the parallel cases of

...putable "evidence"
...good remission"
...factor; incubation of the mixtures did not strengthen this antianaemic effect.
In 7 cases of tapeworm pernicious anaemia the remission was slight or absent,

whether the mixtures were incubated or not but after removal of the tape worm good remission was obtained. Two other cases gave less clear cut results and these are discussed.

The author concludes that the administration of extrinsic factor (meat or yeast extract) and intrinsic factor (normal gastric juice) produces no significant blood remission in cases of tapeworm pernicious anaemia but does produce this in cases of cryptogenetic pernicious anaemia. This result is the same whether the mixtures are incubated for 6 hours at 37°C before administration or not. He suggests the possibility that the tapeworm may destroy the interaction between the intrinsic and extrinsic factors and that this may be the explanation of tapeworm pernicious anaemia. If this is true and if FORMISJE [this Bulletin 1941 v 38 668] is correct in his conclusion that the site of the interaction between the intrinsic and extrinsic factors is the intestinal wall the tapeworm interferes with this interaction in the intestinal wall.

[In the second line of the author's summary the word extrinsic should be intrinsic.] *G Lapage*

BRAC

The authors describe the first clinico-pathological observation in human pathology of *Echinococcus granuloma* of the pleura (Pseudo-tuberculosis of Dévé) in a patient with right hydatid pleura probably due to a hydatid cyst of the lung.

The authors state their reasons for modifying the name Hydatid pseudo-tuberculosis of the serosa (Dévé) and propose to name this entity *Echinococcus granuloma* of the serosa.

So far *Echinococcus granuloma* of the serosa had only been reported in pericardium and peritoneum this being the first case reported in which the pleura was involved.

MAKRUZAT O L. Hidatidos muscular [Hydatids in Muscle] *Rev Asoc Méd Argentina* 1947 June 30 v 61 No 608 486-7

A report of 4 cases

GALLIARD H. Les types de développement exogène de *Strongyloides stercoralis*. Leur transformation par passages expérimentaux [Exogenous Developmental Forms of *Strongyloides stercoralis*] *C R Soc Biol* 1947 Feb v 141 Nos 3/4 102-5

In the exogenous phase of *Strongyloides stercoralis* there are alternative courses of development in the direct—asexual or homogonic—cycle the filariform larva develops directly from the rhabditoid larva passed in the faeces and in the indirect—sexual or heterogonic—there is an intermediate development of male and female rhabditoides. An individual may be infected exclusively with worms showing one or other type of development or with worms showing both types of development. It has been claimed by some workers

evolution predominates in human infestations of *S. stercoralis* in temperate climates, this type also exists in tropical countries and particularly in Indo-China.

In Indo-China there is a determining factor which causes the strains of *S. stercoralis* of human or canine origin always to develop into the same evolutionary type, i.e. the mixed type with the indirect type predominating, very rarely the indirect type alone. This state of stability is reached after a variable number of passages with the dog as host, and it persists indefinitely (88 passages in 5 years in one case, 27 in another, 34 passages in one canine strain, all voluntarily interrupted). This confirms the author's observations on the extreme sensitivity of dog to the human parasite in that country [this *Bulletin*, 1940, v. 37, 650].

This tendency is not conditioned by the nature of the strongyloides larvae as was shown by the results of using separate evolutionary types of larvae, direct, indirect or mixed.

There is no correlation between the exogenous evolutionary type of larvae in man, or its transformation by passage in the dog, and the virulence of the strain. Contrary to Faust's claim that transformation in a given type is accompanied by a diminution in the virulence which in the long run makes the human strain inadaptable to dogs, the author's strains, which have developed into an almost pure indirect evolutionary type, have not lost their virulence after a very large number of passages.

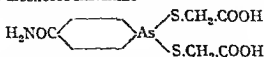
L. E. Napier.

HU, S. M. K. Notes on the Experimental Infection of *Culex pipiens* var. *pallens* Coq. with *Microfilaria malayi* Brug. *Chinese Med. J.* Shanghai Edition. 1946, July-Aug., v. 64, Nos. 7/8, 213-17.

"These infection experiments confirm previous findings in Shanghai indicating the low susceptibility of *Culex pipiens* var. *pallens* to infection with *Microfilaria malayi*, even when there were high microfilarial counts in the blood of the patient at the time of infecting the mosquitoes."

OTTO, G. F. & MAREN, T. H. Filaricidal Activity of Substituted Phenyl Arsenoxides. *Science*. 1947, Aug. 1, 105-7.

... successful in the treatment of *leishmaniasis* in the dog. The activity of arsenicals against filarial parasites has been indicated previously [this *Bulletin*, 1941, v. 38, 151; 1945, v. 42, 304, 837]. Mapharsen has now been found to be very effective *in vitro*. A number of other phenyl arsenoxides were therefore investigated. On studying their effect against the microfilariae of the cotton rat and dog *in vitro* the author found that those with *p*-CONR₂ and *p*-SONR₂ groups showed greatest activity. Mapharsen itself was inactive *in vivo*, but other compounds of the series showed greater promise, and the dithioglycollate of *p*-arsenosobenzamide—



in suitable doses killed all the adult worms of cotton rats and dogs, while failing to eradicate completely the microfilariae in both of these animals. Experiments are now in progress with this substance in the treatment of filariasis in man.

J. D. Fulton.

GARNHAM P C C & McMAHON J P The Eradication of *Simulium neavei* Roubaud from an Onchocerciasis Area in Kenya Colony Bull Entom Res 1947 Mar v 37 Pt 4 619 28 3 figs

There are three onchocerciasis areas in Kenya where the disease is transmitted by *Simulium neavei*. One of these Kibera is well isolated from other infested areas is heavily infested and has been studied in past years so there is a basis of knowledge of the seasonal prevalence of the vector and was thus suitable for an experiment on the eradication of *Simulium neavei*.

The chief breeding places are two rivers which ultimately unite in which there is perennial breeding limited to well defined stretches totalling 15 miles in length. Seasonal tributaries act as subsidiary breeding areas. The principles of the experiment were to apply a DDT/oil/water emulsion to the running water at the upper limit of the infested streams in sufficient quantity to maintain a concentration of at least 2 parts DDT per million parts of water for 30 minutes repeating the process once every 10 days in order to kill successive batches of larvae and checking the results by searches for larvae and pupae but more particularly by searches for adult flies.

Various emulsions were used. The most successful was 20 per cent DDT in toluene with 10 per cent soap and 1 per cent Abracol as a stabilizer diluted to an unstated extent with water before use. The quantities necessary were calculated by accurate measurements of the rate of flow of the rivers at the lower end.

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Tributaries were treated

at one point below a long stagnant stretch of river where they persisted until the arrival of the rains produced a good flow and larvae finally disappeared three months after the start. Adult flies could no longer be caught one month after the start though intensive searches continued for seven months longer. Experience of previous years and of other areas in Kenya makes it very unlikely that this was a seasonal decline and the opinion is expressed that complete eradication of *Simulium neavei* has been secured.

Fish were killed in some numbers but this was thought to be a relatively minor nuisance. Other insect life decreased but subsequently became re-established. *Simulium alcocki* which is not a vector of onchocerciasis re-

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CASIS SACRE G Estado de nuestros conocimientos sobre la oncocercosis [Present Knowledge regarding Onchocerciasis] Medicina Mexico 1947 Aug 10 v 27 No 537 345-50

An examination of the present position and future requirements

DEFICIENCY DISEASES.

PIERS, F. Notes on some Cutaneous Manifestations of Deficiency Disease. *East African Med. J.* 1947, July, v. 24, No. 7, 246-58. [23 refs.]

Twenty-two cases of a deficiency syndrome occurred in a large mental hospital. The outstanding features were those of classical pellagra, but most patients exhibited signs, mainly cutaneous, of deficiency of other B-complex factors, vitamin A, and possibly amino-acids. The interrelationship of these manifestations and the influence of environmental factors other than nutrition in their production are discussed at length.

[The presence of a number of inaccuracies and inconsistencies lessens the confidence with which the conclusions can be accepted, e.g. on p. 247 "The remainder (of the calories) was made up by vegetables (mainly roots)," whereas in Table I—"Vegetables—greens—present amount—8 oz.", and on p. 250, "The follicles are . . . plugged by greasy masses of inspissated horny detritus."]

Dean A. Smith.

VAN VEEN, A. G. & POSTMUS, S. Vitamin A Deficiencies in the Netherlands East Indies. *J. Amer. Dietetic Ass.* 1947, Aug., v. 23, No. 8, 669-73.

This paper summarizes the results of a series of clinical and dietary surveys, particularly in respect of vitamin A status, undertaken in 1937-39 by the Eijkman Institute and Institute for Nutrition Research, Batavia.

Evidence of vitamin A deficiency—xerosis conjunctivae, xerophthalmia and impaired dark adaptation—was found almost entirely in children and more commonly in boys than girls. The dietary survey revealed that the consumption of vegetables is very small in children, especially boys, and that of animal food negligible. Moreover, it was in the more prosperous areas, where least vegetables are eaten, that the incidence of deficiencies was highest.

Red palm oil proved effective in treatment, given either by mouth or intramuscular injection.

A microchromatographic method was used to estimate the individual carotenoids in food and serum. It was found among Javanese prisoners that, even on a low carotene intake, serum vitamin A values were high and values for α - and β -carotene low, indicating a high efficiency of conversion of these provitamins. On the other hand, serum cryptoxanthine levels were high and the authors conclude that this carotenoid does not serve as a provitamin A in human beings as it is known to do in rats.

Dean A. Smith.

SPRUE.

BLACK, D. A. K., BOUND, J. P. & FOURMAN, L. P. R. Fat Absorption in Tropical Sprue. *Quart. J. Med.* 1947, July, N.S. v. 16, No. 63, 99-109. [15 refs.]

Impairment in fat absorption as shown by the excretion of fatty stools is the most constant and characteristic feature of the sprue syndrome; but simple estimation of the percentage of fat in the dry stool, does not give quantitative information on the amount of fat actually absorbed, since it takes no account of the amount of fat in the diet, nor does it measure the total excretion over

any known period. When however a sprue patient is placed on a controlled diet, the following figures for a 4-day period are collected

-	-	-	-	-
				fat intake to fat
				question can be

expressed as —

$$\frac{(\text{dietary fat} - \text{faecal fat})}{\text{dietary fat}} \times 100$$

Fat balance studies have been made on these lines on idiopathic steatorrhoea but not in tropical sprue.

The material for study consisted of 28 soldiers who had acquired sprue on tropical service in India. All had steatorrhoea and had lost 10 per cent of body weight whilst glossitis, moderate anaemia and abdominal distension were common. Two standard diets were used—one with 60 to 70 gm. of fat per diem, the other with 90–100 gm. Two main difficulties in interpretation were encountered, one the unexpected variability of fat output and the other the occasional occurrence of unpredictable spontaneous improvement. Duplicate estimations showed that the error of estimation of fat in the dried stool was less than 5 per cent, but it was found that successive four-day periods might differ in their apparent fat output by as much as 50 per cent. The chief method of overcoming this variability over short periods was to use periods of adequate length, that is to group three periods of four days into a single 12-day period. Spontaneous improvement is not uncommon in patients who are at rest in bed on a controlled diet. Difficulties in interpretation arose from occasional incidence of watery diarrhoea and in some from the change of a 60 gm. to a 96 gm. fat dietary, and from the possibility that some part of

normal subjects.

In 19 patients the percentage of fat absorption varied from 51 to 85 with a median of 75.6 and a median of 80 whilst in normals fat absorption exceeds 90 per cent of the intake. Excreted fat forms a smaller proportion of the faecal fat in the sprue stool in which unabsorbed food fat is much higher than in normal persons. A 10 per cent failure in fat absorption suffices to double the normal daily output of fat in the stools. From the point of view of treatment the wide variation between fat absorption in different patients is of less importance than the changes which a single patient is likely to show from one period to the next without change in treatment.

Fat absorption figures in two patients treated with nicotinic acid 50 mgm

or riboflavin. On the other hand patients who were kept on liver treatment for a month or longer showed a gradual improvement in fat absorption. The striking feature is that with doses of liver extract sufficient to produce rapid clinical improvement there is such a small and gradual effect on the fat absorption defect.

The liver preparations were T.C.F. an Indian preparation containing most of the B-complex substances present in the original liver. Hepastab (Boots) a moderately refined extract and Hepatex (Evans) an extract containing the whole of the vitamin B complex naturally present in liver with added thiamine and nicotinic acid. The standard dose was 4 cc. daily for all preparations and in all a loading dose of 40 cc. spread over four days was given.

intramuscularly. Yeast extract, "Vegemite", resembling "Marmite" was given in a dose of 5 gm. four times daily. In all cases this was combined with 4 cc. or 2 cc. of liver extract daily.

In individual patients, the variance in the fat excretion over a three- or four-day period was significantly smaller when the patients were having yeast extract.

Many patients with early sprue had a normal chylomicron count. In explaining the main results, the authors incline to the view that the action of yeast is a dose-effect and the large amount of yeast contains more of a substance active in improving fat absorption in sprue, whilst liver almost certainly contains some of this substance. Folic acid improves the anaemia of sprue and the diarrhoea and probably fat absorption as well. It is probable that the active principle in yeast extract is also due to folic acid. *P. Manson-Bahr.*

FOURMAN, L. P. R. Changes in Blood Phosphate after Ingestion of Glucose and Fructose in Sprue. *Brit. Med. J.* 1947, Sept. 13, 411-13, 2 graphs. [10 refs.]

When glucose is given by the mouth to normal subjects there is a fall in the plasma inorganic phosphate—a fall which is related to the metabolism of glucose.

phosphate during glucose absorption in sprue h HANES & REISER [this *Bulletin*, 1941, v. 3, "small drop in serum inorganic phosphate in sprue when glucose was given by the mouth, but the normal drop occurred when it was given intravenously: but they found also that the urinary excretion of phosphate after glucose ingestion is greater in patients suffering from sprue than in normal persons.

Five normal persons and four sprue patients were studied. All the latter had steatorrhoea and had lost weight. In each, observations were made after the ingestion of glucose (50 gm.) and fructose (50 gm.).

The following data were obtained for each experiment: (1) Plasma inorganic pb (19 up

the "ester" phosphate changes, by means of Briggs's method. The results in normal persons showed that fructose ingestion is followed by blood-phosphate changes similar to those observed after taking glucose. Using the fall in the whole-blood inorganic phosphate as evidence that the sugars have been absorbed, the author found that two sprue patients had some impairment in the absorption of both glucose and fructose. Like glucose, fructose can form phosphate esters, and a defect in phosphorylation, which may be present in sprue, would be expected to interfere with the absorption of both these sugars.

P. Manson-Bahr.

ADLERSBERG, D. & SCHEIN, J. Clinical and Pathologic Studies in Sprue. [Abridged.] *J. Amer. Med. Ass.* 1947, Aug. 23, v. 134, No. 17, 1459-67.

This report concerns itself with clinical and pathological observations in a group of 40 patients observed at the Mount Sinai Hospital during the past fifteen years. Thirty-six of them were classified as "primary sprue". In six of these latter, post-mortem examinations confirmed the absence of gross systemic disease, although alterations were found in the intestinal canal and

Americans and the remainder first generation Americans of Central and Eastern European extraction but there was a preponderance of Jews and Porto Ricans. In age they varied from 16-73 the average being 41. In this series 7 contracted their illness in the tropics whilst 29 acquired the disease under American climatic conditions. Observations were made over the course of one month to twelve years. The average was 3.6 years. The results of investigations on the biochemical and haematological aspects do not differ from the generally accepted findings but the conclusions regarding vitamin A and fat tolerance are of some interest. The former was studied in 15 cases. In 12 during the active stage the fasting vitamin A level ranged between 10 and 63 microgrammes (the average being 30 microgrammes per 100 cc). This represented a reduction of about 40 per cent.

The disturbance in vitamin A metabolism is characterized by low fasting figures and lack of elevation in the post absorptive phase and is paralleled by the low carotene levels of the serum. Three patients during remission showed that this disturbance may persist in a modified form.

An analogy may be drawn between this observation and the persisting ste

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that 6 patients had a 4 plus response 14 a plus 3 response and 9 a 1 plus response. Fatalities however occurred even in those with good original responses of 1 to 3 plus.

Although in general terms the initial haematological response was not so str.
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27
The
patients the duration of symptoms ranged from three to six months prior to hospitalization. Clubbing of fingers was observed in one. Response to liver therapy was uniformly poor. All four patients in this group died.

In the secondary group massive involvement of the mesenteric glands interfered with absorption.

cases of primary sprue the colour index was 1 or less than 1. In secondary sprue it was invariably less than 1. The leucocyte count averaged 6712 in primary and 10520 in secondary sprue.

The typical oral and lingual lesions of primary sprue apparently require many months or years for their full development and are of minor importance in secondary sprue.

Haemofuscinosis of the muscularis propria of the gastro-intestinal tract was present in two patients. It is probably related to the ceroid pigment described by PAPPEHEIMER and VICTOR [*Amer J Path* 1946, 22: 395] in

SUÁREZ, R. M., SPIES, T. D. & SUÁREZ, R. M., Jr. The Use of Folic Acid In Sprue. *Ann. Intern. Med.* 1947, May, v. 26, No. 5, 643-77, 15 figs [15 refs.]

This report is based on the study of 50 cases of sprue, of which 22 were in the acute stage. The object of the investigation was to determine the optimum oral dose of folic acid and its effect on patients given a diet inadequate in meat, fish and eggs, and from which liver and yeast were excluded; and also its effect in the presence of an adequate diet, high in animal protein, but low in fats and carbohydrates. The influence of this dose upon the glucose tolerance curve and upon the fat content of the stools was examined; and the maintenance dose of folic acid was determined. The question whether folic acid can be substituted for parenteral liver extract in the treatment of chronic cases had also to be decided.

The paper is replete with protocols of cases, and records of the detailed and prolonged investigations on the biochemical and haematological responses in each patient, which it is impossible to summarize. There is also a pathological section based upon 16 autopsies, which is equally detailed, but which does not add materially to existing knowledge of this subject. The shortening and blunting of the intestinal villi of the small intestine in half this number was noted.

The efficacy of folic acid in the treatment of tropical sprue is confirmed. Oral administration of 10 mgm. daily is adequate, and it is found that small daily doses are more effective than 50 times as much in a single dose. Observations on five cases suggest that a daily dose of 20 mgm., together with an adequate sprue diet produces better results than larger doses accompanied by an inadequate diet. The impression is obtained that from 2.5 to 5 mgm. is an adequate maintenance dose in most cases. For patients on a diet high in animal proteins and low in carbohydrates and fat, a smaller amount of folic acid is necessary than for those on a diet low in animal protein but high in carbohydrate and fat.

In chronic cases of sprue, injections are given of Lilly's crude liver extract solution of 2 injectable U.S.P. units per cc. (containing approximately 4.21 micrograms of folic acid per cc.). Of this the authors have been using 6 cc. daily intramuscularly.

It is suggested that liver extract contains some other anti-anaemic substance independent of, and unrelated to, folic acid.

Although it is not precisely stated, it appears that this course is necessary in order to obtain a haematopoietic response. P. Manson-Bahr.

HAEMATOLOGY.

RAO, M. N. & KARMAKAR, G. A Note on estimating Haemoglobin with One Cubic Millimetre of Blood. *Indian Med. Gaz.* 1947, Mar., v. 82, No. 3, 120-22.

The usual methods of estimating haemoglobin require a minimum of 20 cmm. of blood. With small animals it is sometimes difficult to obtain this amount. For a total red cell count, only 1 cmm. is required. The authors have devised a method of estimating the haemoglobin with the balance of the fluid after the red cell count has been made, by adapting the pseudo-peroxidase reaction for detecting minute quantities of blood.

The requirements are (i) a standard 1 per cent benzidine solution and (ii) a standard blood solution (i) Commercial benzidine although marked pure,

first tube 0.5 ml of standard blood solution to the second 0.5 ml. of the unknown blood and to the third distilled water are added. To each tube 0.5 ml of 1 to 2 per cent hydrogen peroxide is added and the colour deepens from green to purple in 2 hours. To each suitable but equal amounts of 20 per cent acetic acid are now added. The cells in the Pulfrich photometer used for matching are 0.5 ml. thick and No. 11 filter is used. The standard and the unknown are successively matched with the control in the other cell in each case. The density drum corresponding to the cell filled with the blood solution is always set at zero and the other drum containing the control solution is rotated in order to find the extinction co-efficient. The result is calculated

$$\frac{\text{Hb content of unknown}}{\text{extinction coefficient of unknown}} = \frac{\text{extinction coefficient of known}}{\text{Hb content of known}} \times \text{Hb content of known}$$

In practice once the extinction coefficient of the known is estimated

$$\frac{\text{Hb content of known}}{\text{extinction coefficient of known}} \text{ becomes a constant}$$

and the haemoglobin content of the unknown can be calculated simply by multiplying the extinction coefficient of the unknown by this constant.

Two series of tests by the Pulfrich photometer with the Hellge method as the control were carried out in the first (14 samples) commercially pure benzidine and in the second (10 samples) " " " " " " " " " " " "

L. E. Napier

PIPPER, V. The Diffraction Method of measuring Red Blood Cells. *J. Lab. & Clin. Med.* 1947 July, v. 32 No. 7 857-77 50 figs (4 coloured) [50 refs.]

the red cell. The yellow ring which forms a narrow band easy to read and sufficiently near to the middle of the spectrum to be suitable is used to estimate the mean cell diameter while the outer edge of the red circle is an expression

of the diameter of the smallest cells in the film and the innermost violet circle is an expression of the largest cells. Thus not only can the mean corpuscular diameter be estimated but also the maximum and minimum cell diameters, while a consideration of the spread of the spectrum reveals the degree and kind of anisocytosis. Poikilocytosis causes a watery ill-defined spectrum difficult to measure, but this in itself is useful information. The author uses a lens of 20 cm. focal length, and it can be shown that, to an accuracy of about 1 per

340,000.

cent., the diameter of the cells is $\frac{\lambda}{r}$ where r is the radius of the spectral

ring on the ground glass and λ is the wavelength of the light; the radii of the rings range from about 1.5 to 3.5 cm. and may be measured by means of a pair of dividers. In a refinement of the apparatus, two equal beams of light are passed, one through a normal blood film and the other through the blood film to be examined. Their spectral rings are then projected by the lens concentrically on to the ground-glass screen, but reciprocal halves of each pattern are blanked off by an axially placed opaque plate. Thus each film produces half a spectral circle and the two halves meeting along a diameter render comparison of sizes and therefore any change in the test film from the normal immediately visible. The author claims the diffraction method to be free of many errors associated with other methods of estimating erythrocyte diameters and more practicable than determinations by means of Price-Jones curves.

F. Murgatroyd.

ALTMANN, A. The Survival of Transfused Erythrocytes in Sickle-Cell Anaemia. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, July, v. 40, No. 6, 901-4, 1 chart. [16 refs.]

"Normal cells transfused into a patient with active sickle-cell anaemia showed normal survival with a linear disappearance curve. The haemolytic process in sickle-cell anaemia only affects the patient's own red cells which are abnormal due to a hereditary factor, whilst normal red cells remain unaffected."

BEET, E. A. Sickle Cell Disease in Northern Rhodesia. *East African Med. J.* 1947, June, v. 24, No. 6, 212-22. [16 refs.]

Of 1,289 Africans examined in the Eastern Province of Northern Rhodesia, 154 showed sickling of their red cells, giving an incidence of 11.9 per cent., which compares closely with the incidence of 12.9 per cent. obtained with Bantu of the Balovale District in Northern Rhodesia [see this *Bulletin*, 1946, v. 43, 774].

No significant difference in incidence due to sex, tribe, malaria, schistosomiasis or ancylostomiasis could be determined. In young children, the incidence appeared higher than in older persons, suggesting that more of those with sicklaemia die before the age of about five years than do normal children, possibly because the former are more liable to contract intercurrent disease. As the spleen rate for those without sicklaemia is higher than that for those with the trait, it is suggested that the spleen in sicklaemia is liable to attacks of thrombosis. Sickle cell disease is often associated with a severe anaemia, but the anaemia is more frequently due to some intercurrent condition than to the sickle cell disease, although the latter may in itself at times cause anaemia.

F. Murgatroyd.

- TRINÇÃO C O mielograma na anemia de células falciformes [The Myelogram in Sickle Cell Anaemia] *An Inst Med Trop* Lisbon 1946 Dec v 3 81-92
1 fig [19 refs] English summary (7 lines)

A review and 4 cases

- SCOTT Annie V Cooley's Anemia (Mediterranean Anemia) in a Chinese Child
Chinese Med J Shanghai 1917 Mar-Apr v 65 Nos 3/4 77-84 [11 refs]

- DAVIDSON L S P Advances in the Treatment of Blood Diseases *Practitioner*
1947 Oct v 159 No 952 311-19 [17 refs]

- KEMP T A Liver and Folic Acid in the Treatment of Nutritional Macrocytic Anaemia A Comparison of Results *Lancet* 1947 Sept 6 350 53,
4 figs

In 3 cases of nutritional macrocytic anaemia with megaloblastic hyperplasia of the bone marrow folic acid produced a more rapid improvement in the peripheral blood than would have been expected with large doses of liver extract parenterally and iron by mouth. The bone-marrow resumed a normoblastic pattern.

- GRANIER DOYEUX M & HOLZ S Factores antianémicos de reciente adquisición con especial mención del Ácido Fólico y factores afines [New Anti-Anaemic Factors, with special reference to the "Folic Acid" Group] *Rev Sanidad y Asistencia Social* Caracas 1946 June-Aug v 11 Nos 3/4 189-256 1 fig [233 refs]

A comprehensive review of present knowledge

- WELCH A D The Present Status of Pteroylglutamic Acid and of other Hematopoietic Agents *Federation Proc* Baltimore 1947 June v 6 No 2 471-9
[40 refs]

DERMATOLOGY AND FUNGUS DISEASES

- CURTIS A C & GREIN J N Histoplasmosis A Review of the Cutaneous and Adjacent Mucous Membrane Manifestations with a Report of Three Cases [Abridged] *J Amer Med Ass* 1947 Aug 9 v 134 No 15
1217-23 7 figs [Refs in footnotes]

This paper presents a useful analytical survey of the published reports of histoplasmosis relative to lesions on the skin and mucous membranes and the authors add three new cases in which lesions on these tissues were a salient clinical feature.

In case 1 (a white woman aged 30) the visible signs of disease were disseminated subcutaneous nodules which tended to undergo caseation necrosis break down and ulcerate on the skin surface discharging a thin yellowish fluid. A nodule in the cervical region enlarged to the size of a hen's egg but other nodules did not exceed a few centimetres in diameter. There was no significant involvement of the lymph nodes. Some of the lesions had a few
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of material from the skin lesions failed to reveal the nature of the disease, but the diagnosis of histoplasmosis was made eventually by the discovery of *Histoplasma capsulatum* in the sputum. The case ended fatally.

Case 2 (a male negro aged 42), suffered from a fungating ulcer measuring 5.0 by 2.5 cm. on the left side of the tongue, associated with swelling and tenderness of that organ, but no restriction of its movements, and accompanied by crusted lesions on the chin and nares. Some of the cervical lymph nodes were swollen and painful and, after incision, discharged a sanguineous material, intermittently, for about four months. By microscopic examination of sections from the tongue lesion, the condition was diagnosed as histoplasmosis, of weight, there was no evidence of phadiazine, 6 gm. by mouth daily "steady clinical remission"; the cutaneous lesions cleared after several weeks and the tongue appeared to be quite normal in less than three months. Although the authors do not claim an unequivocal cure, the result of sulphadiazine treatment is very significant, as hitherto no drug, with the possible exception of antimony, has had any observed effect on this disease.

In case 3 (a male negro aged 25), the disease appeared to be confined to the prepuce and glans penis, with involvement of the inguinal lymph nodes on both sides. Very marked improvement resulted from the administration of sulphadiazine; 522 gm. over a period of 87 days. *J. T. Duncan.*

FERNÁNDEZ LUNA, D., EMILIO CASSET, I. & ABBATE, E. A. Nueva observación de paracoccidioidomicosis. (Forma buco-laríngeo-pulmonar). [A New Case of Paracoccidioidomycosis (Buccal-Laryngeal-Pulmonary Form).] *Rev. Asoc. Méd. Argentina.* 1947, Aug. 15, v. 61, No. 611, 571-5, 14 figs.

MARANO, A. & NIÑO, F. Localización ganglionar del *Paracoccidioides brasiliensis*. [Ganglionic Localization of *Paracoccidioides brasiliensis*.] *Rev. Asoc. Méd. Argentina.* 1947, Aug. 15, v. 61, No. 611, 570-71, 4 figs. English summary (7 lines).

SHAFFER, L. W. & ZACKHEIM, H. S. Sporotrichosis. Report of a Case in which Treatment with Iontophoresis was Successful. *Arch. Dermat. & Syph.* 1947, Aug., v. 56, No. 2, 244-7, 1 fig.

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XLIX*.

Photophthalmia.—Solar photophthalmia among a large number of motor-
the war in the Northern Territory of Australia
year from mid-September to April, which is
conjunctivitis increased amongst these men.
It was least in the months from April to September and after rainfall. The
conjunctivitis came on after an interval, generally about midnight or in the
early hours of the morning; it was not purulent and no significant bacteria
could be cultivated from the affected eyes. Intense photophobia, blepharospasm and lachrymation were present and were most severe on the first day.

* For the 48th of this Series see Vol. 44, pp. 611-618.

¹DWYER, J. M. Solar Photophthalmia. *Med. J. Australia.* 1947, Apr. 26, v. 1, No. 17, 523-5, 1 fig.

*MIANN Ida Blue Haloes in Atebrin Workers Brit J Ophthalm 1947 Jan v 31.
No 1 40-46 4 coloured figs on 1 pl

clouds of fine atehrin dust. They wore protective clothing, goggles and masks, but the dust was so fine that in spite of this they soon noticed yellow staining of the conjunctivae and skin. After working for some weeks or months, they all noticed a blue halo round lights. These haloes were darker blue near the light and pale blue at its outer edge. If the light was placed further away at six metres, faint yellow, green and reddish brown bands appeared outside the blue ring. The visual acuity was unimpaired, there was no ocular pain, lachrymation or photophobia.

Examination with the corneal microscope showed a diffuse pale yellow stain of the conjunctiva in the interpalpebral space only; aggregations of minute dark brown spots were found at the limbus in the exposed portion and also under the edge of the lower lid, but not in the upper quarter of the limbus. They appeared to be an actual deposit, were not movable and could not be washed off.

The whole surface of the cornea was peppered with very fine dustlike particles, which appeared dark yellowish brown by direct illumination and opaque by transmitted light. As in the conjunctiva, the particles were intracellular or at least situated in the substance of the corneal epithelium. The substantia propria and the internal parts of the eye were normal. The particles are not composed of atehrin itself, since this is completely soluble in the tears, but of an insoluble derivative of it.

Complete recovery takes place on removal from contact with atehrin dust.

Optic Nerve Lesions in Typhus.—The frequency of lesions of the optic nerve in exanthematic typhus and murine typhus (flea typhus) is discussed by TOULANT and LARMANDE.⁶ They point out that, although previous writers have reported that these lesions are rare, they have found that in 100 cases of exanthematic typhus bilateral optic neuritis occurred in 74. It occurs largely during the stage of meningeal involvement, that is between the seventh and twelfth day. They consider that the optic neuritis is not due to congestion or parenchymatous neuritis, but to a pure neuritis secondary to inflammation of the meninges; the extent of the optic nerve lesions is dependent upon the intensity of the typhus virus or its toxin. They found that the optic neuritis eventually cleared up completely with recovery of normal vision, but this recovery is slow and the ophthalmoscopic signs persist for one or two months. In a small number of cases, they found that the optic neuritis resulted in optic atrophy with vision more or less affected, even to the extent of blindness.

In murine typhus, they examined 14 cases and found optic nerve involvement in 9 cases. Of these 9 cases, 1 had hyperaemia of the optic disc, 4 mild optic neuritis, and 4 severe optic neuritis.

E. O'G. Kirwan.

MULOCK HOUWER, A. W. Kerato-conjunctivitis epidemica. [Epidemic Kerato-Conjunctivitis.] *Med. Maandblad. Batavia.* 1947, Feb., No. 7, 120-23. [12 refs.]

OLLE, R. G. & HECTOR CAMBIASO, R. Zooparasitosis intestinal y ojos. [Intestinal Parasitism and Ocular Disease.] *Rev. Sanidad Milit.* Buenos Aires. 1946, Sept., v. 45, No. 9, 1055-76, 4 figs.

This is a paper which was read at an Ophthalmological Congress in the Argentine. The time has long passed, say the authors, when "eye diseases"

persistent early decrease of platelets and commonly a subsequent increase in prothrombin and bleeding times. Albumin casts and red cells appeared in the urine in some case.

A first class and beautifully illustrated account of the pathological changes in the heart and the vascular changes from shock. Haemorrhages and parenchymal lesions were

survived more than 24 hours. They included degeneration of megakaryocytes in the bone marrow (attributed by the authors to the hyperthermia) necrosis of heart muscle.

The authors indicate that shock

and not to anoxia and shock in which the distribution of the brain lesions is different.

A very complete list of references is appended to the paper which must be considered one of the best yet written on this difficult subject.

B G Macgrath

MISCELLANEOUS DISEASES

DAVIES J N P Pathology of Central African Natives. Mulago Hospital Post Mortem Studies I and II. East African Med J 1947 May & June 1 24 Nos 5 & 6 180-84 223-9

These papers are based on the findings in 2 994 autopsies recorded at Mulago Uganda from May 1931 to May 1946. The examinations were made by a succession of medical officers [many of whom probably had had no special training in pathology] and in the earlier cases records are often inadequate and sections which may have been cut are missing. In 1 718 instances diagnosis was macroscopic only.

Cancer accounted for 135 cases syphilis 232 tuberculosis 354 pneumonias 710 meningitis peritonitis and septicaemia 388. As the author points out none of the commoner diseases were confirmed or

gus, septicaemia and pyaemia are discussed in some detail and of the pyogenic organisms the pneumococcus is outstanding. Out of 104 cases of primary meningitis this organism was responsible for 58 the meningococcus for 29. Thus the commonest endemic meningitis in and around Kampala is due to the pneumococcus the mortality being a high one.

Pyogenic meningitis accounts for . . . acute bacterial endocarditis, the pneumococcus was responsible for 26 out of 76 cases and in purulent pericarditis 23 out of 46. The author has made out a good case for the importance of this organism to the African.

Twenty-four cases of systemic pyaemia were autopsied, and bacteriological examination made in 8 instances, all showing staphylococci. Pyomyositis accounted for 19 deaths, of which 11 were examined bacteriologically, 7 showing staphylococci, 2 streptococci and two pneumococci. As the author and others note the reason for the frequency of this condition in the tropics still remains a problem [see this *Bulletin*, 1947, v. 44, 751, 752].

Finally, it is remarked that to a large extent the pneumococcus is to the African what the streptococcus is to the European and is the first organism to be considered in cases of septicaemia.

[Two most interesting and thoughtful papers, which would well repay reading by all those practising in Tropical Africa. As the author rightly points out, any successful attempt to raise the general health of the African depends mainly on a greater supply of African doctors; and while these have plenty of European text-books available, too little original work on the biology and physiology of the indigenous population is available. There is a great need for text-books written by those having long and wide experience of ordinary medical practice in the Tropics.]

In conclusion it is to be noted that patients coming to Mulago include a high proportion of homeless, destitute and alien Africans.] C. F. Shelton.

WHARTON, H. J. & DUESSELMANN, W. Favism. A Short Review and Report of a Case. *New England J. of Med.* 1947, June 26, v. 236, No. 26, 974-7. [19 refs.]

A report of a case of favism in an American-born child of Italian extraction. The patient was a boy aged $3\frac{1}{2}$ years. On admission, 16 hours after the onset of haemoglobinuria, he appeared to be moribund, temperature 102°F ., pulse 160 per minute, red cell count 1.14 million cells per cmm., white cell count 20.5 thousand cells per cmm., platelets 248 thousand per cmm.; no spherocytes or sickling observed. Urine contained blood pigments, albumin and coarse granular casts. There was no history of exposure to malaria, but the patient had been given a meal of fava beans on the day of the onset of the illness. Whole citrated blood was administered daily for 5 days with great clinical improvement. The patient was discharged eight days after admission. The spleen was not palpable on admission, but became so on the third day. It was no longer palpable on the day of discharge.

A short discussion on favi . . . made that some obscure cases of . . . origin may have been due to favism. D. G. B. auth.

GENERAL PROTOZOOLOGY.

TAKOS, M. J. Blood Parasites of some Panamanian Birds. *J. Parasitology.* 1947, June, v. 33, No. 3, 229-30.

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DEFICIENCY DISEASES.

PIERS, F. Notes on some Cutaneous Manifestations of Deficiency Disease. *East African Med. J.* 1947, July, v. 24, No. 7, 246-58. [23 refs.]

Twenty-two cases of a deficiency syndrome occurred in a large mental hospital. . . . e of classical pellagra, but most patients of deficiency of other B-complex factors, The interrelationship of these manifestations and the influence of environmental factors other than nutrition in their production are discussed at length.

[The presence of a number of inaccuracies and inconsistencies lessens the confidence with which the conclusions can be accepted, e.g. on p. 247 "The remainder (of the calories) was made up by vegetables (mainly roots)," whereas in Table I—"Vegetables—greens—present amount—8 oz.", and on p. 250, "The follicles are . . . plugged by greasy masses of inspissated borny detritus."]

Dean A. Smith.

VAN VEEN, A. G. & POSTMUS, S. Vitamin A Deficiencies in the Netherlands East Indies. *J. Amer. Dietetic Ass.* 1947, Aug., v. 23, No. 8, 669-73.

This paper summarizes the results of a series of clinical and dietary surveys, particularly in respect of vitamin A status, undertaken in 1937-39 by the Eijkman Institute and Institute for Nutrition Research, Batavia.

Evidence of vitamin A deficiency—xerosis conjunctivae, xerophthalmia and impaired dark adaptation—was found almost entirely in children and more commonly in boys than girls. The dietary survey revealed that the consumption of vegetables is very small in children, especially boys, and that of animal food negligible. Moreover, it was in the more prosperous areas, where least vegetables are eaten, that the incidence of deficiencies was highest.

Red palm oil proved effective in treatment, given either by mouth or intramuscular injection.

A microchromatographic method was used to estimate the individual carotenoids in food and serum. It was found among Javanese prisoners that, even on a low carotene intake, serum vitamin A values were high and values for α - and β -carotene low, indicating a high efficiency of conversion of these provitamins. On the other hand, serum cryptoxanthine levels were high and the authors conclude that this carotenoid does not serve as a provitamin A in human beings as it is known to do in rats.

Dean A. Smith.

SPRUE.

BLACK, D. A. K., BOUND, J. P. & FOURMAN, L. P. R. Fat Absorption in Tropical Sprue. *Quart. J. Med.* 1947, July, N.S. v. 16, No. 63, 99-109. [15 refs.]

Impairment in fat absorption as shown by the excretion of fatty stools is the most constant and characteristic feature of the sprue syndrome; but simple estimation of the percentage of fat in the dry stool, does not give quantitative information on the amount of fat actually absorbed, since it takes no account of the amount of fat in the diet, nor does it measure the total excretion over

GARNHAM P. C. C. & McMAHON J. P. The Eradication of *Simulium nearcticum* from an Onchocerciasis Area in Kenya Colony. *Bull. Entomol. Res.* 1947 Mar. v. 37 Pt. 4 619-25 3 figs

There are three onchocerciasis areas in Kenya where the disease is transmitted by *Simulium nearcticum*. One of these Roderia is well isolated from other infested areas is heavily infested and has been studied in past years so there is a basis of knowledge of the seasonal prevalence of the vector and was thus suitable for an experiment on the eradication of *Simulium nearcticum*.

The chief breeding places are two rivers which ultimately unite in which there is perennial breeding limited to well-defined stretches totalling 15 miles in length. Seasonal tributaries act as subsidiary breeding areas. The principles of the experiment were to apply a DDT oil water emulsion to the running water at the upper limit of the infested streams in sufficient quantity to maintain a concentration of at least 2 parts DDT per million parts of water for 30 minutes repeating the process once every 10 days in order to kill successive batches of larvae and checking the results by searches for larvae and pupae but more particularly by searches for adult flies.

Various emulsions were used. The most successful was 20 per cent DDT in toluene with 10 per cent soap and 1 per cent Abracol as a stabilizer diluted to an unstated extent with water before use. The quantities necessary were calculated by accurate measurements of the rate of flow of the rivers at the lower end of the portion to be treated. Apparently each river was dosed at one point only above the upper limit of infestation the lengths to be treated

the rainy season being five months. Tributaries were treated on four occasions during the rains.

Larvae and pupae rapidly disappeared except at one point below a long stagnant stretch of river where they persisted until the arrival of the rains produced a good flow and larvae finally disappeared three months after the start. Adult flies could no longer be caught one month after the start though intensive searches continued for seven months longer. Experience of previous years and of other areas in Kenya makes it very unlikely that this was a seasonal decline and the opinion is expressed that complete eradication of *Simulium nearcticum* has been secured.

Fish were killed in some numbers but this was thought to be a relatively minor nuisance. Other insect life decreased but subsequently became re-established. *Simulium alcocki* which is not a vector of onchocerciasis reappeared after the end of the experiment but it was known to have been breeding above the points where the rivers were treated and thus to be in a ready position to infiltrate again into the treated zone. The nearest area infested by *S. nearcticum* being six miles away and separated by a ridge of hills reinfestation is thought to be unlikely.

C. MacDonald

CASIS SACRE G. Estado de nuestros conocimientos sobre la oncocercosis. [Present Knowledge regarding Onchocerciasis. *Medicina Mexico* 1947 Aug. 10 v. 27 No. 537 345-50]

An examination of the present position and future requirements

DEFICIENCY DISEASES.

PIERS, F. Notes on some Cutaneous Manifestations of Deficiency Disease. *East African Med. J.* 1947, July, v. 24, No. 7, 246-58. [23 refs.]

Twenty-two cases of a deficiency syndrome occurred in a large mental hospital. The . . . e of classical pellagra, but most patients of deficiency of other B-complex factors. The interrelationship of these manifestations and the influence of environmental factors other than nutrition in their production are discussed at length.

[The presence of a number of inaccuracies and inconsistencies lessens the confidence with which the conclusions can be accepted, e.g. on p. 247 "The remainder (of the calories) was made up by vegetables (mainly roots)," whereas in Table I—"Vegetables—greens—present amount—8 oz.", and on p. 250, "The follicles are . . . plugged by greasy masses of inspissated horny detritus."]

Dean A. Smith.

VAN VEEN, A. G. & POSTMUS, S. Vitamin A Deficiencies in the Netherlands East Indies. *J. Amer. Dietetic Ass.* 1947, Aug., v. 23, No. 8, 669-73.

This paper summarizes the results of a series of clinical and dietary surveys particularly in respect of vitamin A status, undertaken in 1937-39 by the Eijkman Institute and Institute for Nutrition Research, Batavia.

Evidence of vitamin A deficiency—xerosis conjunctivae, xerophthalmia and impaired dark adaptation—was found almost entirely in children and more . . . led that the consumption of . . . oys, and that of animal . . . erous areas, where least . . . was highest.

en either by mouth or intramuscular injection.

A microchromatographic method was used to estimate the individual carotenoids in food and serum. It was found among Javanese prisoners that, even on a low carotene intake, serum vitamin A values were high and values for α - and β -carotene low, indicating a high efficiency of conversion of these provitamins. On the other hand, serum cryptoxanthine levels were high and the authors conclude that this carotenoid does not serve as a provitamin A in human beings as it is known to do in rats.

Dean A. Smith.

SPRUE.

BLACK, D. A. K., BOUND, J. P. & FOURMAN, L. P. R. Fat Absorption in Tropical Sprue. *Quart. J. Med.* 1947, July, N.S. v. 16, No. 63, 99-109. [15 refs.]

Impairment in fat absorption as shown by the excretion of fatty stools is the most constant and characteristic feature of the sprue syndrome; but simple estimation of the percentage of fat in the dry stool, does not give quantitative information on the amount of fat actually absorbed, since it takes no account of the amount of fat in the diet, nor does it measure the total excretion over

any known period. When however a sprue patient is placed on a controlled diet, the following factors are collected:

dietary fat
faecal fat
fat intake to fat
question can be

expressed as —

$$\frac{(\text{dietary fat} - \text{faecal fat})}{\text{dietary fat}} \times 100$$

Fat balance studies have been made on these lines on idiopathic steatorrhoea but not in tropical sprue.

The material for study consisted of 28 soldiers who had acquired sprue on tropical service in India. All had steatorrhoea and had lost 10 per cent of body weight whilst glossitis, moderate anaemia and abdominal distension were common. Two standard diets were used—one with 65 to 70 gm of fat per diem, the other with 95–100 gm. Two main difficulties in interpretation were encountered: one, the unexpected variability of fat output, and the other, the occasional occurrence of unpredictable spontaneous improvement. Duplicate estimations showed that the error of estimation of fat in the dried stool was less than 5 per cent, but it was found that successive four day periods might differ in their apparent fat output by as much as 50 per cent. The chief method of overcoming this variability over short periods was to use periods of adequate length, that is to group three periods of four days into a single 12 day period. Spontaneous improvement is not uncommon in patients who are at rest in bed on a controlled diet. Difficulties in interpretation arose

however, such a change did not affect the interpretation of fat balance results.

On a fat free diet, patients suffering from sprue excreted no more fat than normal subjects.

In 19 patients the percentage of fat absorption varied from 51 to 85 with a median of 75.6 and a median of 80 whilst in normals fat absorption exceeds 90 per cent of the intake. Excreted fat forms a smaller proportion of the faecal fat in the sprue stool, in which unabsorbed food fat is much higher than in normal persons. A 10 per cent failure in fat absorption suffices to double the normal daily output of fat in the stools. From the point of view of treatment, the wide variation between fat absorption in different patients is of less importance than the changes which a single patient is likely to show from one period to the next without change in treatment.

Fat absorption figures in two patients treated with nicotinic acid 50 mgm thrice daily, and in four with the same dose together with riboflavin 5 mgm daily—both intramuscularly—showed no individual change in fat absorption, but taking the series as a whole there was in five out of six a small drop in fat absorption. No clinical improvement was observed with either nicotinic acid or riboflavin, on the other hand patients who were kept on liver treatment for a month or longer showed a gradual improvement in fat absorption. The striking feature is that with doses of liver extract sufficient to produce rapid clinical improvement, there is such a small and gradual effect on the fat absorption defect.

The liver preparations were T.C.F. as Indian preparation (most of the B complex (Boots) a moderately refined preparation containing the whole of added thiamine and nicotinic acid. The standard dose was 4 cc daily for all preparations and in all a loading dose of 40 cc spread over four days was given.

intramuscularly. Yeast extract, "Vegemite", resembling "Marmite" was given in a dose of 5 gm. four times daily. In all cases this was combined with 4 cc. or 2 cc. of liver extract daily.

In individual patients, the variance in the fat excretion over a three- or four-day period was significantly smaller when the patients were having yeast extract.

Many patients with early sprue had a normal chylomicron count. In explaining the main results, the authors incline to the view that the action of yeast is a dose-effect and the large amount of yeast contains more of a substance active in improving fat absorption in sprue, whilst liver almost certainly contains some of this substance. Folic acid improves the anaemia of sprue and the diarrhoea and probably fat absorption as well. It is probable that the active principle in yeast extract is also due to folic acid. *P. Manson-Bahr.*

FOURMAN, L. P. R. Changes in Blood Phosphate after Ingestion of Glucose and Fructose in Sprue. *Brit. Med. J.* 1947, Sept. 13, 411-13, 2 graphs. [10 refs.]

When glucose is given by the mouth to normal subjects there is a fall in the plasma inorganic phosphate—a fall which is related to the metabolism of glucose. The changes in serum inorganic phosphate during glucose absorption in sprue have already been investigated by HANES & REISER [this *Bulletin*, 1941, v. 38, 389] who found an abnormally small drop in serum inorganic phosphate in sprue when glucose was given by the mouth, but the normal drop occurred when it was given intravenously: but they found also that the urinary excretion of phosphate after glucose ingestion is greater in patients suffering from sprue than in normal persons.

Five normal persons and four sprue patients were studied. All the latter had steatorrhea and had lost weight. In each observation were made after

(1) Plasma inorganic

ph
(15
up

the "ester" phosphate changes, by means of Briggs's method. The results in normal persons showed that fructose ingestion is followed by blood-phosphate changes similar to those observed after taking glucose. Using the fall in the whole-blood inorganic phosphate as evidence that the sugars have been absorbed, the author found that two sprue patients had some impairment in the absorption of both glucose and fructose. Like glucose, fructose can form phosphate esters, and a defect in phosphorylation, which may be present in sprue, would be expected to interfere with the absorption of both these sugars.

P. Manson-Bahr.

ADLERSBERG, D. & SCHEIN, J. Clinical and Pathologic Studies in Sprue. [Abridged.] *J. Amer. Med. Ass.* 1947, Aug. 23, v. 134, No. 17, 1459-67.

This report concerns itself with clinical and pathological observations in a group of 40 patients observed at the Mount Sinai Hospital during the past fifteen years. Thirty-six of them were classified as "primary sprue". In six of these latter, post-mortem examinations confirmed the absence of gross systemic disease, although alterations were found in the intestinal canal and

first tube, 0.5 ml. of standard blood solution to the second, 0.5 ml. of the unknown blood and to the third distilled water are added. To each tube 0.5 ml. of 1 to 2 per cent hydrogen peroxide is added, and the colour deepens from green to purple in 2 hours. To each suitable but equal amounts of 20 per cent acetic acid are now added. The cells in the Pulfrich photometer used for matching are 0.5 ml. thick and No. 11 filter is used. The standard and the unknown are successively matched with the control in the other cell in each case. The data to determine the extinction coefficient of the unknown is as follows:

$$\text{Hb content of unknown} = \frac{\text{extinction coefficient of unknown}}{\text{extinction coefficient of known}} \times \text{Hb content of known}$$

In practice once the extinction coefficient of the known is estimated:

$$\frac{\text{Hb content of known}}{\text{extinction coefficient of known}} \text{ becomes a constant}$$

and the haemoglobin content of the unknown can be calculated simply by multiplying the extinction coefficient of the unknown by this constant.

Two series of tests by the Pulfrich photometer, with the Hellige method as the control, were carried out, in the first (14 samples), commercially pure benzidine and in the second (10 samples) specially purified benzidine were used. The correlation coefficient between the results of the two methods was over 0.9 in each case. It is concluded that the method is sufficiently accurate for research purposes but that for this the purified benzidine should be used. For routine purposes commercially pure benzidine could be used.

L. E. Napier

PIJFER, A. The Diffraction Method of measuring Red Blood Cells. *J. Lab. & Clin. Med.* 1947 July, v. 32, No. 7 857-77, 50 figs (4 coloured) [50 refs.]

Thus, but the final composite position of the yellow ring in the complete spectral ring is hardly affected by the superimposition of the diffraction patterns of all the red cells. The yellow ring which forms a narrow band easy to read and sufficiently near to the middle of the spectrum to be suitable, is used to estimate the mean cell diameter, while the outer edge of the red circle is an expression

of the diameter of the smallest cells in the film and the innermost violet circle is an expression of the largest cells. Thus not only can the mean corpuscular diameter be estimated but also the maximum and minimum cell diameters, while a consideration of the spread of the spectrum reveals the degree and kind of anisocytosis. Poikilocytosis causes a watery ill-defined spectrum difficult to measure, but this in itself is useful information. The author uses a lens of 20 cm. focal length, and it can be shown that, to an accuracy of about 1 per

340,000.

cent., the diameter of the cells is $\frac{\lambda}{r}$ where r is the radius of the spectral

ring on the ground glass and λ is the wavelength of the light; the radii of the rings range from about 1.5 to 3.5 cm. and may be measured by means of a pair of dividers. In a refinement of the apparatus, two equal beams of light are passed, one through a normal blood film and the other through the blood film to be examined. Their spectral rings are then projected by the lens concentrically on to the ground-glass screen, but reciprocal halves of each pattern are blanked off by an axially placed opaque plate. Thus each film produces half a spectral circle and the two halves meeting along a diameter render comparison of sizes and therefore any change in the test film from the normal immediately visible. The author claims the diffraction method to be free of many errors associated with other methods of estimating erythrocyte diameters and more practicable than determinations by means of Price-Jones curves.

F. Murgatroyd.

ALTMANN, A. The Survival of Transfused Erythrocytes in Sickle-Cell Anaemia. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, July, v. 40, No. 6, 901-4, 1 chart. [16 refs.]

"Normal cells transfused into a patient with active sickle-cell anaemia"

BEET, E. A. Sick Cell Disease in Northern Rhodesia. *East African Med. J.* 1947, June, v. 24, No. 6, 212-22. [16 refs.]

Of 1,289 Africans examined in the Eastern Province of Northern Rhodesia, 154 showed sickling of their red cells, giving an incidence of 11.9 per cent., which compares closely with the incidence of 12.9 per cent. obtained with Bantu of the Balovale District in Northern Rhodesia [see this *Bulletin*, 1946, v. 43, 774].

No significant difference in incidence due to sex, tribe, malaria, schistosomiasis or ancylostomiasis could be determined. In young children, the incidence appeared higher than in older persons, suggesting that more of those with sicklaemia die before the age of about five years than do normal children, possibly because the former are more liable to contract intercurrent disease. As the spleen rate for those without sicklaemia is higher than that for those with the trait, it is suggested that the spleen in sicklaemia is liable to attacks of thrombosis. Sick cell disease is often associated with a severe anaemia, but the anaemia is more frequently due to some intercurrent condition than to the sickle cell disease, although the latter may in itself at times cause anaemia.

F. Murgatroyd.

TRINÇÃO C O mielograma na anemia de células falciformes [The Myelogram in Sickle Cell Anaemia] *An 1st Med Trop* Lisbon 1946 Dec v 3 81-92 1 fig [19 refs] English summary (7 lines)

A review and 4 cases

SCOTT Annie V Cooley's Anemia (Mediterranean Anemia) in a Chinese Child *Chinese Med J* Shanghai 1947 Mar-Apr v 63 Nos 3/4 77-84 [11 refs]

DAVIDSON L S P Advances in the Treatment of Blood Diseases *Practitioner* 1947 Oct v 159 No 952 311-19 [17 refs]

KEMP T A Liver and Folic Acid in the Treatment of Nutritional Macrocytic Anaemia A Comparison of Results *Lancet* 1947 Sept 6 350-53 4 figs

In 3 cases of nutritional macrocytic anaemia with megaloblastic hyperplasia of the bone marrow folic acid produced a more rapid improvement in the peripheral blood than would have been expected with large doses of liver extract parenterally and iron by mouth. The bone-marrow resumed a normoblastic pattern.

GRANIER DOYEUX M & HOLZ S Factores antianémicos de reciente adquisición con especial mención del Ácido Fólico y factores afines [New Anti-Anaemic Factors, with special reference to the "Folic Acid" Group] *Rev Sanidad y Asistencia Social* Caracas 1946 June-Aug v 11 Nos 3/4 189-256 1 fig [233 refs]

A comprehensive review of present knowledge

WELCH A D The Present Status of Pteroylglutamic Acid and of other Hematopoietic Agents *Federation Proc* Baltimore 1947 June v 6 No 2 471-9 [40 refs]

DERMATOLOGY AND FUNGUS DISEASES

CURTIS A C & GREIN J N Histoplasmosis A Review of the Cutaneous and Adjacent Mucous Membrane Manifestations with a Report of Three Cases [Abridged] *J Amer Med Ass* 1947 Aug 9 v 134 No 15 1217-23 7 figs [Refs in footnotes]

This paper presents a useful analytical survey of the published reports of histoplasmosis relative to lesions on the skin and mucous membranes and the authors add three new cases in which lesions on these tissues were a salient clinical feature.

In case 1 (a white woman aged 30) the visible signs of disease were disseminated subcutaneous nodules which tended to undergo caseation necrosis break down and ulcerate on the skin surface discharging a thin yellowish fluid. A nodule in the cervical region enlarged to the size of a hen's egg but other nodules did not exceed a few centimetres in diameter. There was no significant involvement of the lymph nodes. Some of the lesions healed after a few months but others persisted. Constitutional symptoms with fever and night sweats were marked and there was evidence of a generalized disease in which the lungs were extensively involved. Repeated direct examinations

of material from the skin lesions failed to reveal the nature of the disease, but the diagnosis of histoplasmosis was made eventually by the discovery of *Histoplasma capsulatum* in the sputum. The case ended fatally.

Case 2 (a male negro aged 42), suffered from a fungating ulcer measuring 5.0 by 2.5 cm. on the left side of the tongue, associated with swelling and tenderness of that organ, but no restriction of its movements, and accompanied by crusted lesions on the chin and nares. Some of the cervical lymph nodes were swollen and painful and, after incision, discharged a sanguineous material, intermittently, for about four months. By microscopic examination of sections from the tongue lesion, the condition was diagnosed as histoplasmosis, but, despite malaise, night sweats and loss of weight, there was no evidence of generalized infection. Treatment with sulphadiazine, 6 gm. by mouth daily up to a total dosage of 576 gm., resulted in "steady clinical remission"; the cutaneous lesions cleared after several weeks and the tongue appeared to be quite normal in less than three months. Although the authors do not claim an unequivocal cure, the result of sulphadiazine treatment is very significant, as hitherto no drug, with the possible exception of antimony, has had any observed effect on this disease.

In case 3 (a male negro aged 25), the disease appeared to be confined to the prepuce and glans penis, with involvement of the inguinal lymph nodes on both sides. Very marked improvement resulted from the administration of sulphadiazine; 522 gm. over a period of 87 days. J. T. Duncan.

FERNÁNDEZ LUNA, D., EMILIO CASET, I. & ABBATE, E. A. Nueva observación de paracoccidioidomicosis. (Forma buco-laríngeo-pulmonar). [A New Case of Paracoccidioidomycosis (Buccal-Laryngeal-Pulmonary Form).] *Rev. Asoc. Méd. Argentina*. 1947, Aug. 15, v. 61, No. 611, 571-5, 14 figs.

MARANO, A. & NIÑO, F. Localización ganglionar del *Paracoccidioides brasiliensis*. [Ganglionic Localization of *Paracoccidioides brasiliensis*.] *Rev. Asoc. Méd. Argentina*. 1947, Aug. 15, v. 61, No. 611, 570-71, 4 figs. English summary (7 lines).

SHAFFER, L. W. & ZACKHEIM, H. S. Sporotrichosis. Report of a Case in which Treatment with Iontophoresis was Successful. *Arch. Dermat. & Syph.* 1947, Aug., v. 56, No. 2, 244-7, 1 fig.

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XLIX*.

Photophthalmia.—Solar photophthalmia among a large number of motor-convoy drivers employed during the war in the Northern Territory of Australia is discussed by DWYER¹. Each year from mid-September to April, which is the hot season, the incidence of conjunctivitis increased amongst these men. It was least in the months from April to September and after rainfall. The conjunctivitis came on after an interval, generally about midnight or in the early hours of the morning; it was not purulent and no significant bacteria could be cultivated from the affected eyes. Intense photophobia, blepharospasm and lachrymation were present and were most severe on the first day.

* For the 48th of this Series see Vol. 44, pp. 611-618.

¹DWYER, J. M. Solar Photophthalmia. *Mé. J. Australia*. 1947, Apr. 26, v. 1, No. 17, 523-5, 1 fig.

The bulbar conjunctiva was intensely congested, but usually only in the areas not covered by the eyelid, although the tarsal conjunctiva was also to a lesser extent affected as well. Sometimes corneal involvement occurred in the form of superficial punctate lesions confined to a horizontal band across the cornea corresponding to the area bounded by contracted lids. At the end of 1942 the number of cases rose to nearly 200 a week.

Eye shields, goggles, dark glasses, and eye shades were tried in an attempt to prevent this type of ophthalmia but all were discarded either because they were uncomfortable or because they were of very little benefit. A green strip two inches wide was painted across the top of the windcreens of the motor vehicles for the purpose of obscuring the view of the sky. The men all commented on the sense of comfort the green shade gave them and it proved to be most efficacious in preventing conjunctivitis.

The author considers that as mere shading out of the sky controlled this solar ophthalmia it is due to the absorption of rays direct from the sky and not from the earth's surface nor from the direct rays of the sun.

Blindness.—An analysis of the causes of blindness in 122 cases in Algiers is made by GATHIER.² Trachoma is responsible for the largest number and occurred in 30 of the cases. Smallpox is the cause in 22 cases. Syphilis, responsible for the loss of so many eyes in all countries is only represented by 2 cases of interstitial keratitis but is probably a factor in the causation of optic atrophy in 20 cases and infantile glaucoma in 6 cases. Purulent ophthalmia in infancy was the cause in 16 cases. The author points out that smallpox as a cause of blindness in Algiers must not be overlooked.

Nutritional Deficiency.—Nutritional retrobulbar neuritis in children in Jamaica is discussed by WHITBOURNE³ and CARROLL.⁴ The children were all of mixed European and African blood or of pure-blooded African stock, between the ages of 9 to 16 years, girls were more affected than boys. The vision varied from 6/9 to 2/60. The optic discs were normal in appearance early in the disease but later often showed marked temporal pallor. The visual fields showed small definite central or centro-caecal scotomata. The peripheral fields were normal. Approximately 10 per cent of the children had partial deafness and most of them showed changes in the skin or mucous membrane characteristic of vitamin B complex deficiency. These consisted of excoriations at the angles of the mouth and occasionally at the outer canthi.

treatment started promptly. The condition appears to be similar to the syndrome found in numerous American soldiers released from Japanese prisoner-of-war camps.

Exposure to Atebrin, Mepacrine.—Blue haloes in atebrin workers are discussed by MANN.⁵ Her observations are made on the eye condition of six workers employed in the manufacture of atebrin. The workers were exposed to the dust of the powder and its compression into tablets. The workers complained of eye irritation and discomfort when working 9 hours a day for continued short periods.

²GATHIER, A. Statistique personnelle sur les cas de cécité vus en 1946 à Alger. *Algérie Méd.* 1947 Jan. No. 1, 80-81.

³WHITBOURNE, Dalia. Nutritional Retrobulbar Neuritis in Children in Jamaica. *Amer. J. Ophthalm.* 1947 Feb. v. 30 No. 2, 169-71.

⁴CARROLL, F. D. Nutritional Retrobulbar Neuritis. *Amer. J. Ophthalm.* 1947 Feb. v. 30 No. 2, 172-6, 3 figs.

⁵MANN, Ida. Blue Haloes in Atebrin Workers. *Brit. J. Ophthalm.* 1947 Jan., v. 31, No. 1, 40-46, 4 coloured figs on 1 pl.

clouds of fine atebrian dust. They wore protective clothing, goggles and masks, but the dust was so fine that in spite of this they soon noticed yellow staining of the conjunctivae and skin. After working for some weeks or months, they all noticed a blue halo round lights. These haloes were darker blue near the light and pale blue at its outer edge. If the light was placed further away at six metres, faint yellow, green and reddish brown bands appeared outside the blue ring. The visual acuity was unimpaired, there was no ocular pain, lachrymation or photophobia.

Examination with the corneal microscope showed a diffuse pale yellow stain of the conjunctiva in the interpalpebral space only; aggregations of minute dark brown spots were found at the limbus in the exposed portion and also under the edge of the lower lid, but not in the upper quarter of the limbus. They appeared to be an actual deposit, were not movable and could not be washed off.

The whole surface of the cornea was peppered with very fine dustlike particles, which appeared dark yellowish brown by direct illumination and opaque by transmitted light. As in the conjunctiva, the particles were intracellular or at least situated in the substance of the corneal epithelium. The substantia propria and the internal parts of the eye were normal. The particles are not composed of atebrian itself, since this is completely soluble in the tears, but of an insoluble derivative of it.

Complete recovery takes place on removal from contact with atebrian dust.

Optic Nerve Lesions in Typhus.—The frequency of lesions of the optic nerve in exanthematic typhus⁵ and murine typhus (flea typhus) is discussed by TOULANT and LARMANDE.⁶ They point out that, although previous writers have reported that these lesions are rare, they have found that in 100 cases of exanthematic typhus bilateral optic neuritis occurred in 74. It occurs largely during the stage of meningeal involvement, that is between the seventh and twelfth day. They consider that the optic neuritis is not due to congestion or parenchymatous neuritis, but to a pure neuritis secondary to inflammation of the meninges; the extent of the optic nerve lesions is dependent upon the intensity of the typhus virus or its toxin. They found that the optic neuritis eventually cleared up completely with recovery of normal vision, but this recovery is slow.

In a small number of cases there was optic atrophy with

In murine typhus, they examined 14 cases and found optic nerve involvement in 9 cases. Of these 9 cases, 1 had hyperaemia of the optic disc, 4 mild optic neuritis, and 4 severe optic neuritis.

E. O'G. Kirwan.

MULOCK HOUWER, A. W. Kerato-conjunctivitis epidemica. [Epidemic Kerato-Conjunctivitis.] *Med. Maandblad. Batavia.* 1947, Feb., No. 7, 120-23. [12 refs.]

OLLE, R. G. & HECTOR CAMBIASO, R. Zooparasitosis intestinal y ojos. [Intestinal Parasitism and Ocular Disease.] *Rev. Sanidad Milit.* Buenos Aires. 1946, Sept., v. 45, No. 9, 1055-76, 4 figs.

This is a paper which was read at an Ophthalmological Congress in the Argentine. The time has long passed, say the authors, when "eye diseases" constituted a separate and independent section of medicine and surgery. They

⁵TOULANT, P. & LARMANDE, A. Les lésions du nerf optique au cours du typhus exanthématique et du typhus murin. Leur fréquence. *Bull. Acad. Nat. Méd.* 1947, v. 131, Nos. 17/18, 334-6.

have examined the faeces of 67 patients presenting ocular symptoms and record their findings. The article is divided into four parts. In the first brief notes are given of each of the 67 stating the ocular condition present—conjunctivitis, eczema of the lids, iritis, chalazion, keratitis, etc.—the results of faecal examination and the treatment adopted for the parasitism. The findings may be summarized: *Blastocystis* was found in 39, *E. histolytica* in 27, *Endolimax nana* in the same number, *E. coli* in 13, *Trichomonas* in 7, *Giardia lamblia* in 4, *Chilomastix mesnili* in 2, *Enterobius vermicularis* in one. In the second part pathogenesis is discussed shortly. The authors suggest [not very convincingly] that the presence of the parasite leads to dyspepsia, arboflavinosis, symptoms. This is again and the authors recommend getting well on the usual methods of treatment should be examined for intestinal parasites. [In a country where these are common, faecal examination should surely be a matter of routine; for it is well known that parasitism may delay the cure of any concomitant disease.] Part 4 deals with Prognosis and Treatment. Only 40 cases were followed up: of these 16 were cured, 19 improved, 3 relapsed and 2 were refractory to treatment. The treatment was on the usual lines and consisted of administration of emetine, amoebarsones, enterovioform and yatren or the parasitism and for the eyes borax washes and lactoflavin 3 tablets [strength] daily.

H. Harold Scott

HEAT STROKE AND ALLIED CONDITIONS

LEE, D. H. L. Human Climatology and Tropical Settlement. The John Thomson Lecture for 1946. 34 pp. 9 figs. [29 refs.] 1947. Brisbane University of Queensland.

Opinions current twenty years ago were practically all adverse to the idea that a healthy, virile, productive white race could develop and continue unimpaired in a sub-tropical or tropical climate. However, CILENTO demonstrated that evidence was accumulating which showed continuous adaptation to the environment (with regard to tropical settlement) in tropical Australia. The author refers to the confusion of thought and superficial reasoning underlying most statements made on the effects of tropical climates, and says that the

human body and different environments therefore is difficult. But the central

The multiple reactions of the body to hot environments are classified and

not sufficiently strenuous to provoke frank physiological reactions. It has been suggested that some difficulties occurring in laboratory studies might be overcome by careful observation over a period of time by trained workers living in a tropical community.

During the late war, considerable impetus was given to the study of clothing, but little attention was paid to housing. Any housing studies seem to have been directed towards protection from cold or the provision of full scale air-conditioning. House design for tropical regions has not advanced since 1925, and although many modern developments in design may be applied to tropical housing, many special problems remain. The problem of tropical settlement cannot be solved completely without the assistance of the social scientist.

In the past, population centres have grown up in the tropics almost entirely as dictated by commercial interests, but in the future, although commercial expediency will affect the location of commercial centres, physiological considerations should decide the precise site. Increased speed of communications and transport mean that administration need not necessarily be located in a commercial centre. Physiological considerations should also be taken into account

new places in the tropics

Yet tropical residents

period must be one in

which the person is going away from home, and not back home. A stable, contented, efficient white population cannot be established unless this fundamental principle is firmly established in practice. Detailed recommendations are made concerning the number and duration of long and short holidays in cooler climates, and interim recommendations are made regarding permissible conditions in hot industries in Australia.

F. A. Chrenko.

LADELL, W. S. S. Creatinine Losses in the Sweat during Work in Hot Humid Environments. *J. Physiology*. 1947, July 31, v. 106, No. 3, 237-44, 3 figs. [10 refs.]

"1. The creatinine contents of serial samples of sweat from men working in a hot humid environment were measured and compared with the creatinine contents of saliva and of plasma obtained at the same time.

"2. Increasing the creatinine content of the blood raised that of the saliva correspondingly, but had little effect on that of the sweat.

"3. There is a reciprocal relationship between sweat rate and the creatinine content of sweat."

MALANUD, N., HAYMAKER, W. & CUSTER, R. P. Heat Stroke. A Clinicopathologic Study of 125 Fatal Cases. *Milit. Surgeon*. 1946, Nov., v. 99, No. 5, 397-449, 58 figs. (5 coloured) [71 refs.]

This paper gives a most comprehensive account of the clinical records and autopsy protocols of 125 cases of heat-stroke which occurred in members of the U.S. Army in the southern States of the U.S.A. in the summer months of 1941-45. Nearly all the cases occurred in persons undergoing heavy muscular work in high environmental temperatures. The authors distinguish clearly between the signs and symptoms due to the hyperthermia and those due to secondary shock and complications, including lower nephron nephrosis (renal anoxia). Three types of clinical course were observed: "(1) acute onset with early persistent coma and delirium; (2) acute onset of early coma or delirium, but with remission and late relapse; and (3) insidious onset with progressive course and late development of coma." The clinical picture depended to some extent on the duration of the illness. Laboratory findings included early leucocytosis, normal haemo-concentration, some increase in non protein nitrogen content of the blood and a decrease in CO_2 combining power. There was a

persistent early decrease of platelets and commonly a subsequent increase in prothrombin and bleeding times. Albumin casts and red cells appeared in the urine in some case.

following the appearance of hyperthermia. Congestion and petechial haemorrhages and sometimes oedema were inconstant findings. The authors concluded that the cellular changes resulted from the excessive heat and the vascular changes from shock. Haemorrhages and parenchymal lesions were

survived more than 24 hours they included degeneration of megakaryocytes in the bone marrow (attributed by the authors to the hyperthermia) necrosis of heart muscle lower nephron nephrosis and centrilobular liver necrosis.

The authors state that the clinical laboratory and pathological findings indicate that two factors are operative in heat-stroke hyperthermia and shock. The changes in nervous tissue are primarily due to hyperthermia and not to anoxia and shock in which the distribution of the brain lesions is different.

A very complete list of references is appended to the paper which must be considered one of the best yet written on this difficult subject.

B G Maegraith

MISCELLANEOUS DISEASES

DAVIES J N P Pathology of Central African Natives. Mnlago Hospital Post Mortem Studies I and II *East African Med J* 1947 May & June 3 24 Nos 5 & 6 180-84 223-9

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training in pathology) and in the earlier cases records are often inadequate and sections which may have been cut are missing. In 1718 instances diagnosis was macroscopic only.

Cancer accounted for 135 cases syphilis 232 tuberculosis 354 pneumonias 710 meningitis peritonitis and septicaemia 388. As the author points out, none of the conclusions reached must be accepted more than temporarily until confirmed or otherwise by further work. The staphylococcus pneumococcus, and streptococcus are all important causes of disease the last named less so than in Europe but primary pneumococcal lesions are commoner.

The most interesting part of the papers is that dealing with pyogenic diseases (II)—as the author quotes. The commonest disease of Africans is pus

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Sulphonamides were first used at Mulago in 1938, sulphapyridine was introduced in the same year but was not in general use till 1940, while penicillin was available in 1943, but is still not extensively used.

Pyogenic meningitis accounts for 4.4 per cent. of all autopsies. In acute bacterial endocarditis, the pneumococcus was responsible for 26 out of 76 cases and in purulent pericarditis 23 out of 46. The author has made out a good case for the importance of this organism to the African.

Twenty-four cases of systemic pyaemia were autopsied, and bacteriological examination made in 8 instances, all showing staphylococci. Pyomyositis accounted for 19 deaths, of which 11 were examined bacteriologically, 7 showing staphylococci, 2 streptococci and two pneumococci. As the author and others note the reason for the frequency of this condition in the tropics still remains a problem [see this *Bulletin*, 1947, v. 44, 751, 752].

Finally, it is remarked that to a large extent the pneumococcus is to the African what the streptococcus is to the European and is the first organism to be considered in cases of septicaemia.

[Two most interesting and thoughtful papers, which would well repay reading by all those practising in Tropical Africa. As the author rightly points out, any successful attempt to raise the general health of the African depends mainly on a greater supply of African doctors; and while these have plenty of European text-books available, too little original work on the biology and physiology of the indigenous population is available. There is a great need for text-books written by those having long and wide experience of ordinary medical practice in the Tropics.]

In conclusion it is to be noted that patients coming to Mulago include a high proportion of homeless, destitute and alien Africans.]

C. F. Shelton.

WHARTON, H. J. & DUESSELMANN, W. Favism. A Short Review and Report of a Case. *New England J. of Med.* 1947, June 26, v. 236, No. 26, 974-7. [19 refs.]

A report of a case of favism in an American-born child of Italian extraction. The patient was a boy aged 3½ years. On admission, 16 hours after the onset of haemoglobinuria, he appeared to be moribund, temperature 102°F., pulse 160 per minute, red cell count 1.14 million cells per cmm., white cell count 20.5 thousand cells per cmm., platelets 248 thousand per cmm.; no spherocytes or sickling observed. Urine contained blood pigments, albumin and coarse granular casts. There was no history of exposure to malaria, but the patient had been given a meal of fava beans on the day of the onset of the illness. Whole citrated blood was administered daily for 5 days with great clinical improvement. The patient was discharged eight days after admission. The

It was

is made that some obscure cases of acute haemolytic anaemia of undetermined origin may have been due to favism.

B. G. Macgregairth.

GENERAL PROTOZOOLOGY.

TAKOS, M. J. Blood Parasites of some Panamanian Birds. *J. Parasitology*, 1947, June, v. 33, No. 3, 229-30.

WEINMAN, D & McALLISTER, Joan Prolonged Storage of Human Pathogenic Protozoa with Conservation of Virulence: Observations on the Storage of Helminths and Leptospiras *Amer J Hyg* 1947, Jan., v 45, No 1, 102-21 [16 refs]

The authors report the results of a study on the preservation of various protozoa as well as of leptospiras and helminths, by freezing. The organisms were preserved in the blood or tissues of the host after addition of an anti-coagulant, or in cultures suspended in dilute serum or fresh culture medium,

at -70 – -76°C . Thawing was accomplished in a water bath at 40 – 42°C . The contents of the tubes were then tested for viability of the organisms by direct examination by culture and by animal inoculations. Positive results were

tissues) (c) *Trichomonis hominis* (cultures) (d) *Plasmodium lophurae* (infected blood). Successful results were also obtained with leptospiras *Leptospira icterohaemorrhagiae* (cultures and infected liver) and *L. biflexa* (cultures). Larval helminths (*Huchereria bancrofti*, *Dirofilaria immitis*, *Latemosoides carinii* Ancy) also been stored successfully. *Toxoplasma* *Balantidium* not survive. It is noted strains of parasites to be periods of time

C. A. Hoare

CALUBAQUIB Prudencia B & ROLDA H The Incidence of Intestinal Parasitism among Food Handlers *J Philippine Med Ass* 1947, Apr., v 23, No 4, 149–52

Between October 1945 and April 1946 the authors examined the stools of 819 Chinese and 3862 Filipino food handlers in the Manila Public Health Laboratory. The results of their investigation are set out in two tables indicating, respectively the incidence of intestinal parasites and of multiple infections by them found in each race.

The most prevalent parasite was *Ascaris lumbricoides* which accounted for 55.6 and 60.6 per cent in Filipinos and Chinese respectively. The corresponding figures for *Trichuris trichiura* were 22.5 and 25.4. *Clonorchis sinensis* was found three times in Chinese and only one cestode infection was encountered—a *T. saginata* in a Filipino. Hookworms amounted to 6.2 per cent in Filipinos and 3.2 per cent in Chinese. The commonest double infection was *Ascaris* with *Trichuris* which occurred in 48 per cent of Filipinos and 74 per cent of Chinese. Many other combinations were found.

The authors consider that the incidence of *Entamoeba histolytica* cases and carriers was surprisingly high at rates of 2.3 and 2.8 per cent in Filipinos and Chinese respectively. They recommend that amoebic carriers should not be permitted to be public food handlers and that the latter should be examined periodically. [No evidence is given to show whether vegetative or cystic forms of *E. histolytica* were encountered. The "surprisingly high" figures which the authors attribute to insanitary conditions during the war are not remarkable. Recent figures from Ceylon, Peru and Honduras (this Bulletin 1947, v 44, 717, 818) were considerably higher, and many workers

have found *E. histolytica* in the neighbourhood of 10 per cent. of stools examined in continental U.S.A.]

H. J. O'D. Burke-Gaffney.

BIJLMER, Johannes. Over het opsporen van protozoën en eieren van enkele wormsoorten in de menselijke faeces. [The Detection of Protozoa and Helminth Ova in Human Faeces.] [Thesis for Doctorate of Medicine, Univ., Amsterdam, 19th June, 1947.] 98 pp., 4 figs. [Bibliography.] English summary pp. 77-80. 1947. Amsterdam: P. H. Vermeulen, De Academische Boekwinkel.

This monograph constitutes a thesis submitted by Dr. Bijlmer for the degree of M.D. in the University of Amsterdam and represents the results of his work in the Institute of Tropical Hygiene in that city. The purpose of the work was to investigate the best technique for detecting human intestinal parasites; and in seven chapters the author, having discussed the literature at length, describes the various methods employed, the results obtained and the conclusions drawn. There are numerous informative tables in the text, summaries in English, French and German, and 9 pages of references. The last chapter, which deals briefly with a small survey in Amsterdam, refers to a number of unusual findings and is illustrated with four simple figures.

In the investigation of protozoa, the author compared four concentration techniques; Bayer's, Faust's zinc-sulphate floatation, Otto's (a modification of Faust's) and a simplified Faust technique, in which washing with water was omitted and the faeces were suspended directly in 33 per cent. ZnSO_4 and centrifuged.

Faust's method was the best, but the simplified form gave good results: the latter modification, indeed, saved time and it is claimed that the whole process occupies only 10 minutes—no longer than a direct iodine film—compared with 25 minutes for the original Faust and for Bayer's method.

The concentration methods were not found very effective in the case of *Giardia* infections. Better results were obtained when patients were purged.

Except in the case of *Trichomonas* and *Dientamoeba fragilis*, four concentration examinations of faeces on four different days located 90 to 95 per cent. of the infections, compared with 40 to 50 per cent. with a single direct examination by eosin and iodine. Culture methods were not found practicable.

The author concludes, with regard to the finding of protozoa in faeces, that the best routine procedure is first to examine an eosin film for trophozoites; if this is negative and sufficient cysts are present, an iodine film is examined; if cysts are scanty or absent, the simplified zinc-sulphate concentration is employed, if necessary for four successive days. Purging is desirable in the case of *Trichomonas hominis* and *Dientamoeba fragilis*, which do not form cysts.

The author finds concentration methods of little advantage in the case of helminth ova, but recommends Brug's method [this *Bulletin*, 1922, v. 19, 246] for *Strongyloides* larvae, as he found the zinc-sulphate floatation unreliable for this purpose. All floatation methods failed with unfertilized *Ascaris* eggs. The author doubts whether concentration of the eggs mentioned is "sensible". "One *Ascaris* female lays so many eggs that they can always be spotted in a direct preparation." Regarding hookworm eggs, he writes: "it may be taken for granted that at every infection of clinical significance so many worms are present that the eggs can already be located in the direct examination." The author concludes that for *Ascaris* and hookworms, an ordinary water preparation suffices.

Finally a note is given regarding a survey of several hundred stools among the population of Amsterdam. In one series, 76 per cent. of specimens showed intestinal protozoa, of which *E. histolytica* constituted 5 to 10 per cent.

The investigation dealt with 878 samples of stools from 478 persons In
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W.

H J O D Burke Gaffney

- JOHNSON J G The Physiology of Bacteria Free *Trichomonas vaginalis* J
Parasitology 1947 June v 33 No 3 189-98 4 figs [10 refs]
HOGUE Mary J The Behavior of *Trichomonas vaginalis* in Tissue Cultures a
Movie J Parasitology 1947 June v 33 No 3 199-200

GENERAL ENTOMOLOGY

- FRIZZI G Salivary Gland Chromosomes of *Anopheles* [Correspondence] Nature
1947 Aug 16 226-7 1 fig
WEBB J E A Spraying Apparatus and Testing Chamber for investigating the
Residual Action of Insecticidal Deposits Bull Entom Res 1947 Aug
v 38 Pt 2 209-32 3 figs on 1 pl & 9 text figs

The apparatus makes use of an Aerostyle pneumatic spray gun to atomize
insecticide into a vertical tower The dimensions of the tower permit objects

evaporation of the droplets the tower is pre sprayed to saturate the air in it
Procedure therefore is (1) Pre spray (5 charges of water for aqueous sprays
or 1 lb. of oil for oil sprays)

spray treatment every ten minutes

The apparatus is calibrated for variations of deposit due to various factors
spraying pressure temperature time of exposure to mist volume of liquid
sprayed etc and appears to be reliable in performance The subject is
discussed in great detail which should be sought in the original

J R Busvine

- BOCAT R Étude sur le DDT (4-4 Dichlorodiphényl-trichloroéthane) découverte-
propriétés dosage toxicité-emploi [The Discovery, Properties, Dosage, Toxicity
and Method of Employment of DDT] Méd Trop Marseilles 1947 May-
June v 7 No 3 263-70

A general account

- LOVETT W C D Control of Mosquito Breeding by the Use of D D T Solution
absorbed on Briquettes East African Med J 1947 May v 24 No 5
196-8

In a note (p. 196-198)

Small briquettes are prepared by mixing sawdust and plaster of paris (2 : 1) before wetting ; the mixture is allowed to set in a shallow layer and is cut up into one-inch cubes. These cubes are soaked in a solution of 5 per cent. DDT in diesoline ; it was found that they absorbed about $7\frac{1}{2}$ cc. per cube, which was enough to treat four square yards of water surface. Treatment of wells is simply done by dropping in one or more cubes each month, according to size. Preliminary results were very satisfactory. In the table of results, only culicine mosquitoes and larvae are mentioned.

J. R. Busvine.

HACKMAN, R. H. The Persistence of DDT on Cattle. Reprinted from *J. Council Scient. & Indust. Res.* 1947, Feb., v. 20, No. 1, 56-65, 2 figs. [13 refs.]

"Evidence is brought forward to show that the most important factor causing the removal of DDT from cattle sprayed with DDT preparations is licking, either by the animal concerned, or by another animal. Other factors have been investigated, viz., solar radiation and rain, growth and loss of hair, rubbing, production of skin secretions, absorption into the skin and hair and flaking of the epithelium, but these have been shown to play a minor rôle. It is concluded that the amount of DDT ingested by licking would not be sufficient to produce toxic symptoms."

EDNEY, E. B. Laboratory Studies on the Bionomics of the Rat Fleas, *Xenopsylla brasiliensis*, Baker, and *X. cheopis*, Roths. II. Water Relations during the Cocoon Period. *Bull. Entom. Res.* 1947, Aug., v. 38, Pt. 2, 263-80, 2 figs. [25 refs.]

In a previous paper [this *Bulletin*, 1945, v. 42, 504], the author in his summary stated that "Saturation deficiency during the pre-pupal stage is shown to bear a linear relationship to adult longevity," and the suggestion was put forward that during the period between cocoon formation and pupation the flea larvae lose water in relation to the saturation deficit (s.d.) of the air, the water reserve of the emerging adult depending on the s.d. during this short pre-pupation period. The present paper is an account of experiments undertaken to confirm or disprove this suggestion and to obtain more precise data regarding the water relations during the cocoon period. The ingenious methods by which these data were obtained and studied are fully described, but should be sought in the original since they are not easily summarized. These new experiments have enabled the author to confirm his previous findings that in unfed adult *Xenopsylla*, longevity varies according to the humidity experienced during the cocoon period. On the other hand, these experiments yield proof that the cause lies in the loss of water during the pupal and not, as previously suggested, during the pre-pupal period. On the contrary, within 24 hours of cocoon formation the prepupa begins to absorb water vapour from the air, and continues to do so until the prepupa moults to become a true pupa. This process of water absorption, however, can only occur at a relative humidity of above about 45% per cent. at 12°, 24°, and 35°C. Above this figure the prepupae are incapable of absorbing water and become desiccated. It is significant that 45 per cent. R.H. is the critical one at all temperatures tested, since it shows that the process of absorption of water is not limited by one saturation deficit.

MELLANBY [this *Bulletin*, 1932, v. 29, 823], has shown that, whereas adult *Xenopsylla* can withstand exposure to 38°C. for 24 hours, at all humidities, the larva can only withstand 22°C. in dry air, with a regular rise in their thermal

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ERRATA

Vol 44 No 1 p 44 the reference to the paper by McCANCE R A & BLACK D A K on Anoxia and Renal Function should read *Lancet* 1946 Mar 9 362 (not Mar 2)

Vol 44 No 7 p 642 in ninth line of summary of paper by MACIERRAS on The Australian Anophelines as Vectors of Malaria for *A. mirankensis* read *A. merankensis*

Vol 44 No 9 pp 825 and 826 summaries of papers by SCHWEITZ and DARTVILLE on snails found in the eastern parts of Belgian Congo for *tanganikus* read *tanganikanus* in all cases

Vol 44 No 10 p 883 in the third line of the penultimate paragraph of the summary of Garnham's paper on Exoerythrocytic Schizogony in *Plasmodium kochi* Laveran the word latter should read former

Vol 44 No 11 p 1013 in title of PESIGAN's paper for Lake Maimt read Lake Maimt

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(The bracketed abbreviations after the page numbers indicate the subjects. Page numbers within brackets indicate papers not summarized.)

n. signifies	Amoebiasis and Intestinal Protozoal Infections	Leish. signifies	Leishmaniasis.
rt	Bartonellosis.	Lep	Leprosy.
"	Blackwater.	Mal.	Malaria.
"	Book Review.	Misc. Dis.	Miscellaneous Diseases.
"	Cholera.	Oph.	Tropical Ophthalmology.
ef. Dis.	Deficiency Diseases including Epidemic Dropsy.	Pl.	Plague.
en.	Dengue, Sandfly, and Allied Fevers.	Prot.	General Protozoology.
er.	Dermatology and Fungous Diseases.	Rab.	Rabies.
ys.	Dysentery (Bacillary and Unclassed).	R.F.	Relapsing Fever and other Spirochaetoses.
nt.	General Entomology.	Reports, etc	Reports, Surveys and Miscellaneous Papers.
aem.	Haematology.	Sp	Sprue.
eat Str.	Heat Stroke and Allied Conditions.	Tryp.	Trypanosomiasis.
el.	Helminthiasis.	Typh.	Fevers of the Typhus Group.
ph	Laboratory Procedures.	Ulc.	Tropical Ulcer.
		Vms	Venoms and Antivenenes.
		YF	Yellow Fever.
		Ys.	Yaws.

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 Burrows, R. B., Morehouse, W. G. & Free J. E., 926 (Rel.)
 Burrows, W., Mather, A. N., Elliott, M. E. Wagner, S. M., 422 (Chl.)
 —, McGann, V. G. & Wagner, S. M., 422 (Chl.)
 Burruss, R. W. & Rargett, M. V., 994 (Y.F.)
 Burt, E., 803 (Tryp.)
 —, with Fairbairn, 506 (Tryp.)
 Bussell, L. J., 638 (Rab.)
 Bustamante, M. E. & Varela, G., 656 (Typh.)
 Butler, F. A. & Sapero, J. J., 1034 (Mal.)
 Butler, M. G., 792 (Mal.)
 Butler, R., Davey, D. G. & Spinks, A., 100 (Mal.)
 Buxton, P. A., 795 (Mal.), 860 (B.R.)
 Byrne, E. A. J., 537 (Der.)

C.

- Caballero y C., E., 230 (Hel.)
 Cabannes, with Sarrouv & Roche, 80 (Leish.)
 Cabasso, V., 809 bis (Typh.)
 Cain, L. J., with Smith & Galluo, 177 (Mal.)
 de Caires, P. F., 658, 994 (Y.F.)

- Cairo 831 832 (Hel)
 Cajdos A with Hénard Rambert & Van den Broucke 533 (Harm)
 Cakrlora M with Wolfson 565 (Mal)
 Calero C 525 (R.F)
 Calero M C (932) (Der)
 California Mosquito Control Association 758 (Reports etc)
 Callender S T 743 (Haem)
 Calubagub P B & Rolda H 1169 (Prot)
 Cambier R with Vincke & Lips 386 (Mal)
 Cambournac F J C with Fonseca Pinto Pereira & Cunha 487 (Mal)
 — Simões J M P & Queiroz E J S 181 (Mal)
 Cambre P J with Fite & Turner 1008 (Lep)
 Cameron D A with Elsdon Dew & Horner 310 (Am)
 Cameron J D S (624) Reports etc (714) (Am)
 Campbell A G with Humphreys 758 (Reports etc)
 Campbell B K with Campbell K N Kern & LaForge (34) (Mal)
 — with — Sommers & Kerwin (34) (Mal)
 Campbell K N Helbing C H & Kerwin J P (34) (Mal)
 — & Kerwin J F (34) (Mal)
 — LaForge R A & Campbell B K (34) (Mal)
 — Sommers A H Kern J P & Campbell B K (34) (Mal)
 Canaan T 85 (Am) (719) (Lep)
 Cançado J R 912 (Hel)
 Canepa C H with Pinedo & Pakeiman 532 (Def Dis)
 Cannon W M with Pratt Thomas 363 (Prot)
 Cantacuzéne A & Lupasco G 529 (Hel)
 — with Zotta Radacovici Lupasco & Teodoresco 623 (Misc Dis)
 Cantrell W & Jordan H B 39 (Mal)
 Caplan A & Lindsay J K 618 (Heat Str)
 Carbonell M & Contreras Dueñas 592 (Lep)
 Carbone E A with Fernandez 595 (Lep)
 Card W I & Walker J M 707 (Typh)
 Carini A (716) (Am)
 Carlson H J Bissell H D & Mueller M G 39 (Mal)
 — Mueller M G & Bissell H D 174 (Mal)
 Carpenter K J with Kodicek & Harris 119 (Def Dis)
 Carraud G (715) (Am)
 Carroll D G with Winkenwerder Hunninen Harrison Billings & Maier 834 (Hel)
 Carroll F D 1034 (Oph)
 Carruthers L B 425 (Am)
 Cartwright G E & Wintrobe M M 608 (Haem)
 Caruana M with Durand & Benamusa 56 (Leish)
 Casanova J 116 (Def Dis)
 Casini G (274) (Mal)
 — with Soper Knipe Riehl & Rubino 877 (Mal)
- Casis Sacré G (1084) (Hel)
 Castellani A 1022 (Lab)
 Castillo R L 276 (Mal)
 Castle W B with Shen & Fleming 1045 (Mal)
 Catanel A 536 1019 (Der)
 — with Parrot & Collignon 700 (Mal)
 Causey O R Deane L M & Deane M P 20 (Mal)
 — with — & Deane M P 20 bis (Mal)
 Cawson F G (221) (730) (1010) (Hel)
 Ceburkina N V with Tovarnickij & Krontovskaja (301) (Typh)
 Ceccaldi J 45 (Tryp) 75 (YF)
 — Paquer P Trinquier E Pelussier A & Vargues R 949 (Rab)
 Ceuthaml J & Evans E A Jr 567 (Mal)
 Cerqueira N L & Lane J 1063 (YF)
 — with de Mendonça 960 (Mal)
 Ceylon Health News 238 (Misc Dis)
 Chakraborty D C with Sen & Basu 209 (Chl)
 Chakravarty H with Chaudhuri (522) (Am)
 Chakravarty N K with Sen Gupta P C (807) (Leish)
 Chika J I 597 (Lep)
 Chandler A C with Addis (443) (Hel)
 Chang C T with Chu Huang & Kao 493 (Chl)
 Chang C C T with Reimann Chu Liu & Ou 423 (Chl)
 Chapman N B Gibson G M & Mann F G (1037) (Mal)
 Chardome M with Peel 339 (Hel)
 Chazaff E with Bendich 407 (Typh)
 Charters A D 620 (Ulc)
 Chatterjee J B with Das Gupta 745 (Haem)
 Chatterjee H N 628 (Lab) 998 (Chl)
 Chatterjee P K & Banerjee A (989) (Typh)
 Chauderon J 342 (Def Dis)
 Chaudhuri A K R (213) (Lep)
 Chaudhuri R N & Chakravarty H (522) (Am)
 — & Chaudhuri M N R 82 (Am)
 — & Mukerji A K 920 (Hel)
 Chaudhuri M N R with Chaudhuri R N 82 (Am)
 Chaussinand M (1008) (Lep)
 Chelarescu M with Ciuca & Balut 561 (Mal)
 — with — & Cristescu 359 (Mal)
 Chen G with Schueler & Geiling 1052 (Tryp)
 Cheney G with Bereston 748 (Der)
 — & Geib W A 70 (Typh)
 Cheng Fang Tsu 692 (Mal)
 Chenkin T with Brodie Udenfriend & Dill 793 (Mal)
 Chenoweth B M Jr with Stoll, Loughlin & Harris 444 (Hel)
 — with — & Peck 737 (Hel)
 Cherrington M E with Darby & Ruffin 456 (Sp)
 Chesterman C C 282 (Mal) 527 (Ys) 683 (Reports etc) 1048 (Tryp)
 Chhatre K D with Simeons 77 (Pl)

- Chifflet, A. & Llopart, J., (835) (Hel)
 Chorine, V. & Tanguy, Y., 211 (Am.)
 Chou, T. C., with Blaschko & Wajda, (698) (Mal)
 Choudhuri, R. K. S., 298 (Leish.)
 Choussat, H., with Lebon & Dubouché, (525) (R.F.)
 Christenson, L. D., with Oman, 953 (Mal)
 Christianson, H. B., Gordon, H. H., Daniels, W. B. & Lippincott, S. W., 21 (Mal)
 —, with —, Dieulaide, Marble & Dahl, 963 (Mal)
 —, with — & Lippincott, 176 (Mal)
 Christophers, S. R., 158 (Mal)
 Chu, L. W. & Huang, C. H., 423 (Chl.)
 —, with —, 419 (Pl.)
 —, Chang, C. T. & Kao, H. C., 423 (Chl.)
 —, with Reimann, Chang, Liu & Ou, 423 (Chl.)
 Chung, H. L., with Feng, 1055 (Leish.)
 Ciaccio, G., with Giroud, (703) (Typh.)
 Ciaravino, E. & Sofia, F., 495 (Mal)
 Cilli, V. & Corazzi, G., 846 (Vms)
 Ciuca, M., Balluf, L. & Chelarescu, M., 561 (Mal)
 —, & Cristescu, A., 559 (Mal)
 Claessens, H., 49 (Tryp)
 Clapp, J. M., Fay, R. W. & Simmons, S. W., 563 (Mal)
 —, with — & —, 562 (Mal)
 Clark, W. B., 603 (Hel)
 Clark, W. M., 400 (Mal)
 Clarke, B. L. W., 231 (Def. Dis.)
 Clarke, O., with Manson-Bahr, 456 (Sp.)
 Claude, with Sarrouy & Combe, 55 (Leish.)
 Cluer, E. H., 1004 (Am)
 Coates, A. E., 353 (Misc Dis.)
 Cochran, J. H., with Linduska & Morton, 681 (Ent.)
 Cochran, R. G., 1026 (B.R.), 1073, 1075 (Lep)
 —, Menon, K. P. & Pandit, C. G., 322 (Lep)
 —, & Ramanujain, K., 323 (Lep.)
 Cocker, D. E., 257 (B.R.)
 Coda, D., with Forbes, 158 (Mal)
 Codeleone, E., 302, 307, 512 (Typh.)
 —, with d'Ignazio, 526 (R.F.), (193) (Typh.), 539 (Misc. Dis.)
 Coggeshall, L. T., 278 (Mal)
 Coghill, N. F., Lawrence, J. & Ballantine, I. D., 718 (R.F.)
 Cohen, H. A., 756 (Lab)
 Cohen, M. G., with Hunter & Ingalls, 440 (Hel)
 Cohn, R., with Bianco, Saunders & Levine, 1034 (Mal)
 Coito, A. de M. F., with de Meira, 1014 (Hel)
 Colaço, A. T. F., 1020 (Ent.)
 Cole, G., 602 (Hel)
 Cole, L. C. & Koepke, J. A., 468 (Ent)
 Collard, P. & Kendall, D., 903 (Am.)
 Collignon, E., 701 (Mal)
 —, with Parrot & Catanel, 700 (Mal)
 —, with Sergeant & Sergeant, 692 (Mal)
 Collomb, H., with d'Ignazio, 178 (Mal)
 Combe, P., with Sarrouy, (319) (Am)
 —, with — & Claude, 55 (Leish.)
 Conejos, M., with Romafia & Lizondo, 300 (Leish.)
 Congo Belge, 1024 (Reports, etc.)
 Connellan, J. D., with Dakin, 915-(Hel)
 Conte, D., with Miyara, Horenstein & Córca, 815 (Pl.)
 Contreras Dueñas, with Carbonell, 592 (Lep.)
 Cook Islands, New Zealand, 1022 (Reports, etc.)
 Cookson, L. O. C., 975 (Tryp.)
 Corazzi, G., with Cilli, 846 (Vms)
 Corcoran, A. C. & Page, I. H., 539 (Misc. Dis.)
 Córca, P., with Miyara, Conte & Horenstein, 815 (Pl.)
 Corkill, N. L., with Kirk, 122 (Vms.)
 Cornatzer, W. E., with Kyker & McEwen, 502 (Mal)
 Cortés, E., with Patiño Camargo, García, Santos, Zozaya, Rueda & Rosa del Valle, 1037 (Mal)
 Cortes, G., with Elderfield, Kremer, Kupchan & Birstein, (964) (Mal)
 Corvazier, R., with Boquet & Girard, 233 (Vms.)
 da Costa, E., 556 (Mal)
 Costa, O. G. & Mariano, J., (726) (Lep.)
 —, with Neves, 610 (Der.)
 Coudert, J. & Baud, C., 241 (Ent.)
 Coulston, F. & Huff, C. G., 970 (Mal)
 —, with —, Laird & Porter, 1046 (Mal)
 Courtois, C., with Jepson & Moutia, 1030 (Mal)
 Coutinho, H., with Monteiro, Janz & de Loureiro, 340 (Def. Dis.)
 Coutinho, J. O., 789 bis (Mal)
 Cova-Garcia, P., 630 (B.R.)
 Covalada, J., with Matilla & Aparicio Garrido, 279 (Mal), 443 (Hel), (608) (Haem.)
 Covell, G., (155), 797 (Mal)
 Cowie, D. B., with Bartter, Most, Ness & Forbush, 1012 (Hel.)
 Cowper, S. G., 217 (Hel.), 409 (Typh.)
 Cox, G. W., 198 (Typh.)
 Cox, H. R., with de Boer, Kunz & Koprowski, 712 (Den.)
 —, with Koprowski, 518 (Den.)
 —, Tesar, W. C. & Irons, J. V., 710 (Typh.)
 Cram, E. B. & Piles, V. S., 217 (Hel)
 de Crisenoy, J., (555) (Mal)
 Cristescu, A., with Ciuca, Balluf & Chelarescu, 559 (Mal)
 Cristol, S. J., Haller, H. L. & Lindquist, A. W., 466 (Ent.)
 Crodol, B., with Haagen, 196 (Typh)
 Cropper, C. F. J., 83 (Am)
 Cross, J. B., with Scott, (447) (Hel)
 Culbertson, J. T., with Gellhorn & Rose, 602 (Hel)
 —, & Pearce, E., 229 (Hel.)
 —, Rose, H. M., Hernández Morales, F., Oliver González, J. & Pratt, C. K., 924 (Hel)
 —, & Oliver-Gonzalez, J., 912 (Hel.)
 Culwell, W. B., with Josephson & Trembley, 1030 (Mal)
 Culwick, A. T. & Fairbairn, H., 821 (R.F.)
 —, with —, 649, 1051 (Tryp)
 Cunha, with Fonseca, Cambournac, Pinto & Pereira, 487 (Mal)

- da Cunha J F with Taylor 414 (Y.F.)
 Cuocolo R with Planet & de Almeida 90 (Am)
 Curbelo A with Albacete & Florin (1071) (R.F.)
 — with Milanes Rodriguez Kouri & Spies 452 (Sp)
 Curd F H S (648) (Mal)
 — Davis M I Hoggarth E & Rose F L (964) (Mal)
 — Landquist J K & Rose F L (954) (Mal)
 — Landquist J K & Rose F L (699) (Mal)
 — & Raison C G (699) (Mal)
 — & Rose F L (1037) (Mal)
 — & Rose F L 263 (Mal)
 Curtis A C & Grekin J N 1092 (Der)
 Cury A 235 (Der)
 Custer R P 697 (Mal)
 — with Malamud & Haymaker 1097 (Heat Str)
 Cutler J G 1079 (Hel)
 Czaczkes J W with Olitzki & Kuzenok 195 (Typh.)

D

- Dack S & Moloshok R E 662 (Am)
 Dahl L K with Gordon Dieuaide Maible & Christianson 983 (Mal)
 Dakin W P H & Connellan J D 915 (Hel)
 Damberville C with Bellerive 16 (Mal)
 Dame L R 964 (Mal)
 Dammin G J with Weller 93 (Hel)
 Daniels W B with Christianson Gordon & Lippincott 24 (Mal)
 — with Mason Paddock & Gordon 732 (Hel)
 Dao Van Ty with Brumpt 184 (Mal)
 Darby W J Cherrington M E & Ruffin J M 456 (Sp)
 — with Jones & Warden 740 (Sp)
 — Kaser M M & Jones E 608 (Sp)
 Darlow H M 548 (Reports etc)
 Darteville E with Schwetz, 825 bis (Hel)
 Das, N N with Panja 999 (Chl)
 Das Gupta C R 1104 (BR)
 — & Chatterjea J B 745 (Haem)
 — with Majumder 183 (Mal)
 — with Napier 1104 (BR)
 Dautner M 805 (Tryp)
 Davalos A with Beltran 960 (Mal)
 — with — & Sandoval 965 (Mal)
 Davey D G 282 646 (648) 954 (Mal) 1048 (Tryp)
 — with Butler & Spinks 1037 (Mal)
 Davey J B 683 (Reports etc)
 Davey P with Hunt 694 (Mal)
 Davey T F 325 (Lep)
 David W A L & Bracey P 133 544 (Ent)
 Davidson L S P (1092) (Haem)
 — & Girdwood R H 342 (Haem) 741 (Sp)
 — & Innes E M 740 (Sp)
 Davies G E & Fishburn A G 369 (Lab)
 Davies J N P (238 1098 (Misc Dis)
 Davis D E 705 (Typh)
 — & Pollard M 303 (Typh)
 — with — & Olsen 303 (Typh)
 Davis D H S 76 (Fl)
 Davis F P with Haas Wilcox & Ewing 290 (Mal)
 Davis L J (532) (Haem)
 Davis M I with Curd Hoggarth & Rose (964) (Mal)
 Davis W A 989 (Typh)
 — with Soper Markham & Riehl 892 (Typh)
 Dawes, B 762 (BR)
 Deane H W 17 (Mal)
 Deane, L M, Causey O R & Deane M P 20 bis (Mal)
 Deane M P with Deane L M & Causey 20 bis (Mal)
 Dearborn E H 403 (Mal)
 — & Marshall E K Jr 403 568 (Mal)
 — with Marshall 292 bis (Mal)
 Debono J E 985 (Leish)
 Deibel H K 727 (Lep)
 Delage B with Blanc 931 (Vms)
 De Lamater J N & Hallman F A 1066 (Am)
 Delpy L P (755) (1020) (Ent)
 Delightish, J with Gurevitch 581 (Am)
 Dell J M Jr & Klinefelter H F Jr 171 (Mal)
 Del Sel M. & Gliberti C (665) (R.F.)
 Denhoff E 598 (Hel)
 — & Kolnodny M H 748 (Ulc)
 Denny Brown D 843 (Def Dis)
 Deonier C C Jones H A & Incho H H, 289 (Mal)
 — with — & — 504 (Mal)
 Derham A P (251) (Reports etc)
 Derrick E H 757 (Reports etc)
 Desai S D with Figueredo 214 bis (Lep)
 Destaing F with Benhamou Leonsrdon & Vargues, (586) (R.F.)
 Deas S C & Morrill A W Jr 134 (Ent)
 Dexter M with Bernstein Stearns & Lott (964) (Mal)
 Dey N C with Panja & Ghosh 1018 (Der)
 Dharmendra Bose R & Sen Gupta P C 189 (Leish)
 — & Mukherji N (728) (Lep)
 — & Santra I 324 (Lep)
 — & Sen N R 324 (Lep)
 Dias E Laranja F S & Nobrega G (651) (Tryp)
 Diaz A F with Bozicevich Donquian Mazzotti & Padilla 669 (Hel)
 Daz Rivera R S Santos J J & Perez Santiago E 199 (Typh)
 Dick G W A 849 (Misc Dis)
 — & Bowles R V 643 (Mal)
 Dickmann G H 221 (Hel)
 Didier R (652) (Leish)
 Diercks F H & Tibbs R O 894 (Typh)
 Dieuaide F R with Gordon Marble Christianson & Dahl 953 (Mal)
 Diez Melchor F with Piedrola Gil 636 (Rab)
 Dill — — — — —
 Dms — — — — —
 Dng — — — — —

- Discombe, G. & Watkinson, G., (608) (Haem.)
 Dixon, K., with Drew & Samuel, 453 (Sp.)
 Dlugosz, H., 278 (Mal.)
 Dobrotvorskaya, N. V., with Kojevnikov & Latyshev, 940 (B.R.)
 Dogiel, V. A., 477 (B.R.)
 Dolmatova, A. V., 887, 982 (Leish.)
 Dominguez, M., with Sabalette & Iglesias, 664 (R.F.)
 Donaldson, A. W. & Otto, G. P., (335) (Hel.)
 Donovan, A., with Bozicevich, Mazzotti, Diaz & Padilla, 869 (Hel.)
 Do Prado, F. C. & Figliolini, F., 583 (Am.)
 Dorofejew, W. N., with Stein, (214) (Lep.)
 Dorrance, G. M. & Bransfield, J. W., 602 (Hel.)
 Dostrovsky, A. & Sagher, F., (353) (Ulc.), 987, 1056 (Leish.)
 Doucet, G., 451 (Def. Dis.)
 —, with Neulejan, 57 (Typh.)
 Dougan, A. A., with Fletcher & Sammon, (209) (Am.)
 Douglas, J. R., 755 (Ent.)
 Down, H. A., with Harris, 581 (Am.)
 Downing, G., with Brodie, Udenfriend & Dill, 793 (Mal.)
 Downs, W. G., 1045 (Mal.)
 —, Harper, F. A. & Lisansky, E. T., 553 (Mal.)
 Drew, R., Dixon, K. & Samuel, E., 453 (Sp.)
 Drummel, G., 840 (Def. Dis.)
 Dusrte, E., (676) (Der.)
 Dubin, I. N., 955 (Mal.)
 Dubois, A., 229 (Hel.), (806) (Tryp.)
 Dubouché, G., with Lebon & Choussat, (525) (R.F.)
 Dubourg, E., with Bonnin & Moretti, 343 (Haem.)
 Duesselmann, W., with Wharton, 1099 (Misc. Dis.)
 Duffner, G. J., 345 (Der.)
 Dungal, N., 100 (Hel.)
 Dunitz, J. D., with Fulton, 983 (Leish.)
 Dunlop, E. E., 353 (Misc.)
 Dubort, M. & Teodorescu, A. M., 904 (Den.)
 Durand, P., Benmussa, S. & Caruana, M., 56 (Leish.)
 Durand-Delacré, R., with Parrot, (754) (Ent.)
 Dureux, C., 1023 (Reports, etc.)
 —, Bolron, H. & Koerber, R., 991 (Y.F.)
 Dwinelle, J. H., 907 (Ys.)
 Dwyer, J. M., 1093 (Oph.)
 van Dyke, H. B. & Gelhorn, A., 512 (Leish.)
 —, with —, 298 (Mal.)
 —, with —, & Tupikova, 334 (Hel.)
- E.
- Ends, R. B., 36 (Mal.), (136) (Ent.)
 Earle, K. V., 53 (Tryp.), (129), 362 (Misc. Dis.)
 Ecker, H. D. & Lubitz, J. M., (986) (Leish.)
 Edder, H. H., (250) (Reports, etc.)
 Edder, L. G., 879 (Mal.)
 Edge, P. G., 862 (B.R.)
 Edney, E. B., 1103 (Ent.)
 Edwards, M. L., 715 (Am.)
 Eeraerts, W., 49 (Tryp.)
 Eichbaum, F. W., (930) (Vms.)
 Einhorn, N. H., 695 (Mal.)
 — & Miller, J. F., 215 (Hel.)
 — & Tomlinson, W. J., 393 (Mal.)
 Eisenhower, E. W., with Russell & Roose, 425 (Am.)
 Ekzempljarskaja, E. V., 907 (R.F.)
 Ekzemplarskaya, E. V., 182 (Mal.)
 El Ayadi, M. S., 433 (Hel.)
 Elderfield, R. C., Kremer, C. B., Kupchan, S. M., Burstein, O. & Cortes, G., (954) (Mal.)
 Elford, W. J., with van den Ende, Stuart-Harris, Fulton, Niven, Andrewes, Begg, White, Hawley, Mills, Hamilton & Thomas, 472 (B.R.)
 El-Gammal, Y., with Attiah & Salem, 613 (Oph.)
 Elshewitz, H., 1064 (PL)
 El Kordy, M. I., 601 (Hel.)
 —, with Ayadi, (312) (Am.)
 —, with Halawani, 312 (Am.)
 Ellerbrook, L. D., with Gordon, Marble, Lippincott & Hesselbrock, 173 (Mal.)
 —, with Lippincott, Marble, Hesselbrock, Engstrom & Gordon, 166 (Mal.)
 —, with —, Paddock, Rhees & Hesselbrock, 601 (Hel.)
 Elliott, M. E., with Burrows, Mather & Wagner, 422 (Chl.)
 Ellis, J. M., with Young & Stubbs, 492 (Mal.)
 —, with —, —, Burgess & Eyles, 275 (Mal.)
 Elmendorf, J. E., Jr., with Barnhill, K. G. & Takos, M., 882 (Mal.)
 —, Marucci, P. E., Griffin, J. B., Meyer, S. L. & Ryan, G. S., 466 (Ent.)
 Elsdon-Dew, R., with Horner, R. & Cameron, D. A., 310 (Am.)
 Elvehjem, C. A., with Luckey, Moore & Hart, 119 (Def. Dis.)
 Emilio Caset, L., with Fernandez Luna & Abbate, (1093) (Der.)
 Emmons, G. W., with Olson & Bell, 848 (Der.)
 Engstrom, W. W., Gordon, H. H., Marble, A. & Brunsting, H. A., 961 (Mal.)
 —, with Lippincott, Marble, Ellerbrook, Hesselbrock & Gordon, 166 (Mal.)
 Ephrati, P., 930 (Vms.)
 Epidemiological Information Bull. (UNRRA Health Division), Wash., 73 (Y.F.)
 Erlan, M., 913 (Hel.)
 Erlanger, H., with Levine, 395 (Mal.)
 Ernakova, N. E., 726 (Lep.)
 Eskin, V. A., with Lisova & Soffyer, 876 (Mal.)
 Espersen, T., 100 (Hel.)
 Etherington, D., Hickling, S., Roden, A. T. & Sellick, G., 163 (Mal.)
 — & Sellick, G., 19 (Mal.)
 Evans, E. A., Jr., 400 (Mal.)
 —, with Ceithaml, 567 (Mal.)
 Ewing, F. M., with Haas & Wilcox, 1045 (Mal.)
 —, with —, — & Davis, 290 (Mal.)
 Eyles, D. E., Hunter, G. W. & Warren, V. G., 837 (Hel.)
 — & Most, H., 838 (Hel.)
 —, with Young, Stubbs, Ellis & Burgess, 275 (Mal.)

F

- Fabregoule M., with Lebon (665) (R.F.)
 Fagan K J 303 (Misc Dis.)
 Faget G H, 588 593 727 (Lep.)
 — & Podge R C (728) (Lep.)
 — — — 326 bus (Lep.)
 — — — Fite G L Prejean B M
 & Geimar F 594 (Lep.)
 Fähræus J with Hammarstrom & Hellsten
 194 652 (Typh.)
 Fajuenbaum J with Neghme 734 (Hel.)
 Fari A 1020 (Hel.)
 Fairbaum H & Burt E 506 (Tryp.)
 — & Culwick A T 619 1031 (Tryp.)
 — with — 821 R.F.
 Fairley N H 175 282 398 399 (Mal) 535
 (Misc Dis.)
 Fajerstein, S C & Besdenjesznich K V
 409 (Typh.)
 Falcon Trejo A 274 (Mal) 984 (Leish.)
 Fallone O 553 (Mal.)
 Faller S R with Hurlbut Maple Wilson
 & Husman 881 (Mal.)
 Falls A M 479 (Mal.)
 Farooq M & Qutubuddin M 609 (Hel.)
 Farr A G with Young & Mc Kendrick (426)
 (R.F.) 448 (Hel.)
 Faust E C 833 (Hel.)
 — Heilbrunn I Lewis R & Murray M L
 1067 (Am.)
 — Hess A D & Young M D (158)
 (Mal.)
 — & Ingalls J W with See J K 331
 (Hel.)
 — with Wright McMullen & Bauman 832
 (Hel.)
 Fawcett D G with Arnold & Simmons 277
 (Mal.)
 Fawdry A L 344 (Haem.)
 Fawzy R M., with Makar 1011 (Hel.)
 Fay R W with Clapp & Simmons S W
 563 (Mal.)
 — Simmons S W & Clapp J M 562
 (Mal.)
 Federation Proc 400 (Mal.)
 Federico Guillot C & Osvaldo Curci A 591
 (Lep.)
 Federico Heinert J 1080 (Hel.)
 Fedorov V G 544 (Ent.)
 Feibly L 673 (Def Dis.)
 Feigenbaum A & Landau J (618) (Oph.)
 Feinstein M Yesner R & Marks J L 66
 (Typh.)
 Feldman, A 297 (Leish.)
 Feng L C & Chung H L 1055 (Leish.)
 Fenner F 514 (Typh.)
 Ferebee S H & Furcolow M L 932 (Der.)
 Ferguson P F Arnold E H & Upholt
 W M 645 (Mal.)
 — with Mathis & Simmons 644 (Mal.)
 Ferguson M S with Bang Hairston &
 Graham 435 (Hel.)
 — Graham O H Bang F B & Hairston
 N G 435 (Hel.)
 — with Sullivan 435 (Hel.)
 Fermon D A 874 (Mal.)
 Fernandes J S with Payne & Balthazar
 502 (Mal.)
 Fernández E (308) (Y.F.)
 Fernandez J M M & Carboni E A. 595
 (Lep.)
 Fernández Luna D Emilio Caset I &
 Abbate E A (1093) (Der.)
 Ferrebee J W & Geiman Q M 17 (Mal.)
 — Gibson J G & Peacock W C 17
 (Mal.)
 Ferreira F S da C. 1052 (Tryp.)
 Ferreira, L de C with Laemmert & Taylor
 414 (Y.F.)
 Ferreira M O with Rachou 1037 (Mal.)
 Ferro R with Jaffé 433 (Hel.)
 Ferro-Luzzi G with Jannone & Mora 751
 (Reportis etc.)
 Fettes D 128 (Misc Dis.)
 Fighiolini F with Do Prado 583 (Am.)
 Liguereido N & Desai S D 214 bus (Lep.)
 Piles V S with Cram 217 (Hel.)
 Findlay G M 527 (Ys.) 579 (Y.F.)
 — Hardwicke J & Phelps A J 406
 (Tryp.)
 — with Hill & Macpherson 94 (Ys.)
 — Macgrath B G Markson J L &
 Holden J R 501 (Mal.)
 — & Markson J L 584 (Bi.)
 — with Robertson 747 (Haem.)
 — Robertson W M & Zacharias F J
 344 (Haem.)
 Fine R with Machella & Burgoon 557
 (Mal.)
 Finland M & Lesses M F 1061 (Typh.)
 Fischer H & Almazy F (175) (Mal.)
 Fischer I (320) (R.F.)
 Fischer W J H Jr & York C L 25 (Mal.)
 Fishburn, A G with Davies 369 (Lab.)
 Fisk P W with Tarswell 583 (Mal.)
 Fite G L Cambre P J & Turner M H
 1008 (Lep.)
 — with Faget Podge Johansen Prejean &
 Geimar 594 (Lep.)
 Fitzgerald P J 274 (Mal.)
 Flandrum J with Provost (1006) (R.F.)
 Fleck L 1057 (Typh.)
 Fleming E M with Shen & Castle 1045
 (Mal.)
 Fleming J Bignall J R & Blades A N.
 711 (Den.)
 Fletcher D E & Rigdon R H 42 (Mal.)
 Fletcher J P Dougan A A & Sammon,
 G K (209) (Am.)
 Fletcher O K Jr 392 (Mal.)
 Flinn L B Howard J W Todd C W &
 Scott E G 413 (Typh.)
 Floch H 53 (Tryp.) 103 (Hel.) 242 bus
 (Ent.) 486 (Mal.)
 — & Abonnenc E (131) (132) (681)
 (Ent.) (644) (Mal.)
 — & Grimaldi J T 665 (R.F.)
 — & de Lajudie P 322 589 724 (727)
 (Lep.) 922 bus (Hel.) 1007 (Ys.) (1054)
 (Tryp.)
 — Taillefer Grimaldi J & de Lajudie P
 93 (R.F.)
 Florin M C with Albacete & Curbelo (1071)
 (R.F.)
 Florio L with Black & Stewart 899 (Den.)
 — & Stewart M O (711) (Den.)
 Foner A., with Adler 313 (Am.)

- Fonseca, F., Cambournac, F. J. C., Pinto, M. R., Pereira, J. M. & Cunha, A., 487 (Mal.)
- da Fonseca, O. Jr., 610 (Der.)
- da Fonseca Santos, H. S., 506 (Bl.)
- Fontan, A., Verger, P., Moulies, A. & Martin, C., 638 (Mal.)
- Forbes, L. S. D. & Coda, D., 158 (Mal.)
- Forbush, S., with Bartrter, Cowie, Most & Ness, 1012 (Hel.)
- Forrester, J. S., with Sayen, Pond & Wood, 305 (Typh.)
- Forster, E. B., (100) (Hel.)
- Fort & Zottner, 298 (Leish.)
- Foshay, L., 837 (Hel.)
- Foster, L. E., with Baker, Sommer, Meyer & Meyer, 712 (Pl.)
- Fourman, L. P. R., 1087 (Sp.)
- , with Black & Bound, 1085 (Sp.)
- Fowler, A. F., 978 (Tryp.)
- Fowler, R., with Mezey, (350) (Der.)
- Fox, D. G. R., with Yofe, 160 (Mal.)
- Fox, L., (938) bis (Ent.)
- Fox, J. P., 1062 (Y.F.)
- & Laemmert, H. W., Jr., 1062 (Y.F.)
- , with Peterson, 813 (Typh.)
- Franks, M. B., 107, 446 (Hel.)
- Fraser, P., 1022 (Reports, etc.)
- Freed, J. E., with Burrows & Morehouse, 926 (Hel.)
- Freedman, B., with Thomson, 673 (Def. Dis.)
- Freeman, N. E., with Hodges, 621 (Misc. Dis.)
- Freire Muñoz, C., 635 (Rab.)
- de Freitas, G., with Muniz, 296 (Leish.), 571 (Tryp.)
- French, R. S., with Meleney, 410 (Typh.)
- Friedheim, E. A. H. & Vogel, H. J., (806) (Tryp.)
- Friess, 442 (Hel.)
- Frisch, A. W., with Oppenheim & Whims, 449 (Hel.)
- Fritz, R. F., with Bradley, 180 (Mal.)
- Frizzi, G., (1102) (Ent.)
- Frommeyer, W. B., Jr. & Spies, T. D., 746 (Haem.)
- Fukelman, R., with Pinedo & Canepa, 532 (Def. Dis.)
- Fuller, H.
- Fulton, F.,
- , with Niven, Hawley, (B.R.)
- Fulton, J. D. & Dumitz, J. D., 983 (Leish.)
- , with Harrison, 190 (Leish.)
- & Lourie, E. M., 403 (Tryp.)
- Funder, J. F. & Jackson, A. V., 294 (Typh.)
- Furcolow, M. L., with Ferebee, 932 (Der.)
- Furlonger, E., with Macpherson & Lee, 934 (Heat Str.)
- Furtado, J. J., (322) (Lep.)
- Fusté, R., with Kouri & Iriondo, (903) (Am.)
- G.
- Gabathuler, A. W., with Gabathuler, 921 (Hel.)
- Gabathuler, M. J. & Gabathuler, A. W., 924 (Hel.)
- (233)
- Gage, J. C. & Rose, F. L., 500 (Mal.)
- Gahan, J. B. & Payne, G. C., 880 (Mal.)
- Gajardo-Tobar, R. & Honorato, A., (852) (Misc. Dis.)
- & Vildosola, E., 847 (Vms.)
- Gale, G. W., 856 (Reports, etc.)
- Gall, E. A. & Steinberg, A., 876 (Mal.)
- Gallais, P., (877) (Mal.)
- Gallenson, N., 413 (Typh.)
- Galliard, H., 1014, 1082 (Hel.)
- & Ngu, D. V., (695) (Mal.), 733, (737) (Hel.)
- Gallup, B. N., with Smith & Cain, 177 (Mal.)
- Gallup, J., 421, 660 (Chl.)
- Garcia, E. Y., with Pesigan, 244 (Lab.)
- Garcia, V., with Patiño Camargo, Cortés, Santos, Zozaya, Rueda & Rosa del Valle, 1037 (Mal.)
- García Miranda, A., 431 (Lep.)
- Garcin, G., 617 (Oph.)
- Gardner, A. D., 426 (R.F.)
- Garnham, P. C. C., 241 (Ent.), 666 (R.F.), 882 (Mal.)
- & McMahon, J. P., 1084 (Hel.)
- Gartrell, F. E. & Orgain, H., 20 (Mal.)
- Gast Galvis, A., 848 (Der.)
- , with Anderson, 813 (Y.F.)
- Gauld, R. L., with Robbins & Warner, 63 (Typh.)
- Gauthier, A., 1094 (Oph.)
- Gear, J. H. S., 1024 (Reports, etc.)
- & Murray, N. L., 702 (Typh.)
- Gee, F. L., 649 (Tryp.)
- Geib, W. A., with Cheney, 70 (Typh.)
- Geiling, E. M. K., with Schueler & Chen, 1032 (Tryp.)
- Geman, Q. M., Anfinson, C. B., McKee, R. W., Ormsbee, R. A. & Ball, E. G., 1043 (Mal.)
- , with —, —, — & —, 1043 (Mal.)
- , with Ferrebee, 17 (Mal.)
- , with McKee, 649 (Mal.)
- , with —, Ormsbee, Anfinson & Ball, 1043 (Mal.)
- Gelbjerg-Hansen, G., (754) (Misc. Dis.)
- Gelfand, M., 232 (Def. Dis.), (462), 539, 937 (Misc. Dis.)
- Geller, E. R., 927 (Hel.)
- Gellhorn, A. & van Dyke, H. B., 298 (Mal.)
- , with —, 512 (Leish.)
- , Rose, H. M. & Culbertson, J. T., 602 (Hel.)
- , Tupikova, N. A. & van Dyke, H. B., 334 (Hel.)
- Gemar, F., with Faget, Pogge, Johansen, Fite & Prejean, 594 (Lep.)
- Gendel, B. R., 609 (Haem.)
- Gérard, R., (737) (Bel.)
- Gerdjokoff, I., (789) (Mal.)
- Gerin, L., (495) (Mal.)
- Gerjovich, H. J., with Pijoan, Hopwood, Jachowski & Romine, 369 (Ent.)
- Gersdorff, W. A. & Barthel, W. F., 467 (Ent.)
- Gersh, I., with Tullis, Jenney, McLimans & Vinson, 895 (Typh.)
- Gevorikov, A. A., 486 (Mal.)
- Geyer, A., with Grall, (129) (Misc. Dis.)
- Ghosh, A. R., with White, 739 (Mal.)
- , with — & Rao, 37 (Mal.)

- Ghosh L. M. with Panja & Dey 1018 (Der)
 Ghosh, N. C. with Banerjee 452 (Def Dis)
 Ghosh S. K. with Panja 928 (Chl)
 Ghosh S. M. with Wu McClymont & Roy 454 (En)
 Ghoo E. 173 (Misc D.s.)
 Gibbs A. J. (62) (Prot)
 Gilbert C. with Del Sol, Cfo (P.P)
 Gibson G. M. with Chapman & Mann (1037) (Mal)
 Gibson J. G. with Ferabee & Peacock 17 (Mal)
 Gibson Q. H. & Hanson, D. C. 121 (Haem)
 Giegoh G. (181) 304 (Mal)
 Gil, J. with Romaña 405 (Tryp)
 — with — & de Romana 404 (Tryp)
 Gil Lopez, C. with Ignacio Baldo Mayer & Pifano 1077 (Hel)
 Gill S. (190) (Leish) 754 (Ent)
 Gillespie J. B. with Swiger & Turner 463 (Der)
 Gilman J. & Vanson M. 13 (Ent)
 Gillett J. D. with Hardow & Highton, 515 (L.P)
 William A. G. 408 Typh
 Gilmann J. & Gilmann T. (322) (Def Dis)
 — with — 118 Der D
 Gilmann, T. & Gilmann, J. 118 (Def Dis)
 Giral A. R. & Poletti J. G. 523 (Lep)
 Gimgrich, W. D. & Schoch, E. W. 970 (Mal)
 — Schoch E. W. Schrab M. & Shepherd C. C. 873 (Mal)
 Ginsburg J. M. (631) 923 (Ent)
 Girard G. 570 (Pl)
 — with Ramon & Rochou 60 P
 — & Candor G. 900 (Pl)
 Girard O. with Boquet & Corvazier 235 (Vms)
 Girard, V. C. & Khoury C. 122 (Der)
 Girdwood, R. H. with Davidson 342 (Haem)
 741 ()
 — with — & Innes 740 (Sp)
 Girma, B. with Bedford & Aidaros 433 (Hel)
 Giroud, P. 304 704 (704) (Typh)
 — & Ciccio G. (63) (Typh)
 — & Jadin, J. 831 (Typh)
 — & Jude A. 103 (Typh)
 — with Montel 372 (Lep)
 Giroux, J. with Hurant & Braun Blanquet, 1013 (Hel)
 Glagova E. M. (692) (Mal)
 Glasgow J. P. 47 (Tryp)
 Glenn P. M. Kaplan L. I. Read H. S. & Becker F. T. 167 (Val)
 Godfrey L. W. (443) (Hel)
 Gokhale V. G. with Pendse Phakda & Bhude (681) (Ent)
 — — — — —
 Golder, A. 678 (Ulc)
 Goldsmith, G. A. 674 (Haem)
 Goldsmith K., 502 (Mal)
 Goldstein A. C. 378 (Hel)
 Goldstein L. with Graset (1017) (Vms)
 Gómez Marciano A. 390 (Mal)
 Gomez Rodriguez, G. 137 (Lab)
 Gonçalves A. P. 235 349 847 (Der)
 González Barrerios G. with Hernández Morales 273 (229) (Hel)
 Gonzalez Prendes M. A. with Ibarra Pérez, 40 590 (Lep)
 — with Oera Setten & Ibarra Perez 90 583 (Lep)
 Coorhal L. D. (302) (Er)
 Gordadze G. N. with Kamafor Tsutsunava, Ibranzhulu, Kamafor & B. Kamafor, 274 (Hel)
 Gordon E. S. with Albright (714) (Am)
 Gordon H. H. with Christianson, Daniels & Lippincott 24 (Mal)
 — & Lippincott S. W., 176 (Mal)
 — Deuande, P. R., Marble A., Christianson H. B. & Dahl, L. E., 65, (Mal)
 — with Engstrom Marie & Brunting 561 (Mal)
 — with Lippincott, Marie Ellersbrook, H. Ellersbrook & Engstrom 16 (Mal)
 — Marble A., Lippincott S. W. Hesselbrock, W. B. & Ellersbrook, L. D., 173 (Mal)
 — with Mason, Darie's & Paddock, 732 (Hel)
 Gordon I. 801 (Mal) (600) (Ent)
 Gordon J. E. & Knies P. T., (59) (Pl)
 Gordon, R. M. & Hill M. A. 402 (Mal)
 Gosselin R. E. with Molnar Tomlin Brown & Adolph 461 (Heat Str)
 Goswell, O. (519) (Den)
 Gouch H. K. 78 (Pl)
 Graham O. H. with Bang Hairston & Ferguson 435 (Hel)
 — with Ferguson Bang & Hairston 435 (Hel)
 — with McMullen 917 (Hel)
 Grammer W. E. 644 (Mal)
 Grall, A. & Geyer A. (129) (Misc Dis)
 Grant P. C. 130 (Misc D.s.)
 Grant Doyeux M. & Holz S. (1097) (Haem)
 Grant C. W. with McLimans 706 (Typh)
 Grasset E. 419 570 (Pl)
 — & Goldstein L. (1017) (Vms)
 Graves P. R. 603 (Def Dis)
 Graham, J. G. with Martin Collins & Lincoln 334 (Hel)
 Great Britain 280 (BP)
 Greenberg M. Peltzer G. J. & Jellison, W. L., 990 (Typh)
 — Klein I. F. & Huebner R. J., 707 (Typh)
 — with Shookhoff & Birnkraft 603 (Hel)
 Greenwood, M. 636 (Rab) 862 (B.R)
 Greif R. L. 714 (Am)
 Grekin J. N. with Curtis, 1092 (Der)
 Grenoulet, G. (621) (Ulc) 628 (Pl)
 Greval, S. D. S. & Bhaduri P. N. 239 (Misc Dis)
 Griffin J. B. with Elmendorf Marucci, Meyer & Ryan 466 (Ent)
 Griffiths J. T., Jr. 1060 (Typh)
 Grimaldi, J. T. with Floch, 663 (R.F.)
 Groupe V., Nigg C. & Macfarlane J. O., 197 (Typh)
 Guennec with Soubzou & Autheman, 585 (Am)
 Guha P. C. with Bami & Iyer (793) (Mal)
 — & Mukherjee S. P. (58) (Mal)

Guillaume, A., (701) (Mal.)
 Guimarães, F. N., 719 (Ys.)
 Gunnison, J. B., with Lazarus, 1024 (Pl.)
 Gunther, C. E. M., 178 (Mal.)
 Gunther, F. A. & Tow, L. R., 133 (Ent.)
 Gurevitch, J. & Delightish, J., 581 (Am.)
 Guyane, Française, 53 (Tryp.), 103 (Hel.), 486 (Mal.), 242 bis (Ent.)
 Gyorgy, P., with Perlungiero, (622) (Misc. Dis.)

H.

Haagen, E. & Crodel, B., 196 (Typh.)
 Haagen, E., 852 (Typh.)
 Haas, V. H., Wilcox, A., Davis, F. P. & Ewing, F. M., 290 (Mal.)
 —, —, & Ewin, F. M., (1045) (Mal.)
 Habel, R., 951 (Rab.)
 Habibi, A., with Parrot, (132) (Ent.)
 Hackett, C. J., 527 bis (Ys.)
 Hackett, L. W., 276 (Mal.)
 —, with Putnam, 15 (Mal.)
 Hackman, R. H., 1103 (Ent.)
 Hadaway, A. B. & Barlow, F., 1038 (Mal.)
 —, with —, 1053 (Tryp.)
 —, with Symes, 545 (Ent.)
 Haddad, C., Sheiban, A. & Budeir, R., 320 (R.F.)
 Haddow, A. J., Gillett, J. D. & Highton, R. B., 516 (Y.F.)
 —, with Smuthburn, 71 (Y.F.)
 —, —, Mahaffy, A. F. & Bugher, J. C., 992 (Y.F.)
 Hafiz, A., with Halawani, 329 (Hel.)
 Haggis, (1036) (Mal.)
 Hair, H. C., with Peterkin, 643 (Mal.)
 Hairston, N. G., with Bang, 435 (Hel.), 1038 (Mal.)
 —, with —, Graham & Ferguson, 435 (Hel.)
 —, with —, Maier & Trager, 281, 503 (Mal.)
 —, with —, Trager & Maier, 696 (Mal.)
 —, with Ferguson, Graham & Bang, 435 (Hel.)
 —, with Trager & Bang, 1036 (Mal.)
 Halawani, A., 331, (667) (Hel.)
 —, & Abdallah, A., 220 (Hel.)
 —, Baz, I. & Morkos, F., 698 (Mal.)
 —, Baz, I. I. & Morcos, F., 792 (Mal.)
 —, & El Kordy, M., 312 (Am.)
 —, & Hafiz, A., 329 (Hel.)
 —, Nor-el-Din, G., Shaker, M. & Khalek, F. A., 99 (Hel.)
 Hall, G. A. M., 937 (Misc. Dis.)
 Hall, T. F. & Hess, A. D. 1042 (Mal.)
 —, with Penfound & Hess, 21 (Mal.)
 Hallberg, V., 591 (Lep.)
 Haller, H. L., with Cristol & Landquist, 466 (Ent.)
 Hallman, F. A., with DeLamater, 1066 (Am.)
 Hamilton, F., with van den Ende, Stuart-Harris, Fulton, Niven, Andrewes, Begg, Elford, White, Hawley, Mills & Thomas, 472 (B.R.)
 Hammarström, E., Fahraeus, J. & Hellsten, M.D.H., 194 (Typh.)
 —, Hellsten, H. & Fahraeus, J., 652 (Typh.)
 Hammouda, M., 221 (Hel.)
 (233)

Hampton, S. F., 573 (Typh.)
 Handier, P., (733) (Def. Dis.)
 Hanks, J. H., (213), 323, 721, 722 bis, 723 bis, 724 (Lep.)
 Hansen, E. L., with Anderson & Johnston, 819 (Am.)
 —, with Bond, Bostick & Anderson, 59 (Am.)
 Harant, H., Giroux, J. & Braun-Banquet, M., 1013 (Hel.)
 Hardwicke, J., with Findlay & Phelps, 40 (Tryp.)
 Hare, K. P., (621) (Ulc.), 738 (Def. Dis.)
 Hargett, M. V., with Burruss, 994 (Y.F.)
 Hargreaves, W. H., 80 (Am.)
 Harndas, G., 844 (Def. Dis.)
 Harper, J. O., 620 (Ent.)
 Harper, P. A., with Downs & Lisansky, 95 (Mal.)
 —, with Levine, 953 (Mal.)
 —, Lisansky, E. T. & Sasse, B. E., 953 (Mal.)
 Harris, A. H. & Dorn, H. A., 581 (Am.)
 —, with Stoll, Loughlin & Cnenoweth, 44 (Hel.)
 Harris, J. O., (387) (Leish.)
 Harris, L. J., with Kodicek & Carpenter, 11 (Def. Dis.)
 Harrison, C. V. & Fulton, J. D., 190 (Leish.)
 Harrison, D. C., with Gibson, 121 (Haem.)
 Harrison, T., with Winkenwerder, Hunnington, Billings, Carroll & Maier, 834 (Hel.)
 Hart, E. B., with Luckey, Moore & Elvehjem, 119 (Def. Dis.)
 Hartz, P. H., 101 (Hel.)
 —, with Van der Sar, (123) (Der.)
 Harvey, A. E. C., 679 (Ent.)
 Harvey, C., 353 (Misc. Dis.)
 Hashem, M., 730 (Hel.)
 Hatchett, S. P., 366 (Ent.)
 Haulon, J., with Pasquet, 127 (Heat Str.)
 Hauschka, T., Saxe, L. H., Jr. & Blair, M., 1054 (Tryp.)
 Havard, R. E., with Macgrath, 44 (BL.)
 Hawking, F., 648, 970 (Mal.), 1034 (Tryp.)
 Hawksley, J. C., 360 (Misc. Dis.)
 Hawley, W. L., with van den Ende, Stuart-Harris, Fulton, Niven, Andrewes, Begg, Elford, White, Mills, Hamilton & Thomas, 472 (B.R.)
 Haymaker, W., with Malamud & Custer, 1097 (Heat Str.)
 —, with Weil, 577 (Typh.)
 Hayman, J. M., with Most, Kane, Lavietes, London & Schroeder, 496 (Mal.)
 Hayman, J. M., Jr., with Bazemore, Johnson & Swanson, 559 (Mal.)
 —, with Most & Wilson, 443 (Hel.)
 Haynes, D. M. & Hess, W. I., 460 (Der.)
 Hays, E. E. (533) (Haem.)
 Hayward, G. W., 81 (Am.)
 Hazra, A. K., Lahiri, D. C. & Sokhey, S. S., (235) (Vms.)
 Heath, G. B. S. & Mitchell, J. G., 734 (Ent.)
 Heath, R. F., (1039) (Mal.)
 Heathcote, R. S. A., 130 (Misc. Dis.)
 Hector Cambiaso, R., with Oile, 1095 (Oph.)
 Hedge, K. V., with Shamanna, 520 (PL.)
 Hegsted, D. M., with Roos & Stare, 403 (Mal.)
 Heide, E. A., 193 (Typh.)

delberger M with Mayer 172 (Mal)
 Ibrunn I with Faust Lewis & Murray
 967 (Am.)
 Iig R 512 (Typh)
 Irie R W with Suarez, Welch Suarez &
 Ielson 607 (Sp)
 Isch R B 678 (Misc Ds)
 Ibing C H with Campbell & Kerwin (34)
 (Mal)
 Ilerman L Bovarnick M R & Porter
 J C 400 (Mal)
 Ilisten H with Hammarstrom & Fähræus
 52 (Typh)
 Ilisten M D H with Hammarstrom &
 Fähræus 194 (Typh)
 Iwz E B with Jennison & Milstone
 679 (Misc Ds)
 Iwig E O & Brown R G (442) (Hel)
 Inderson A B & Thornell H E 609
 (Haem)
 Inderson C R with Kark, Alton Pease
 Bann Johnson & Richardson 842 (Def
 Dis)
 Inderson Begg A 509 (Tryp)
 — & Fulton F 577 (Typh)
 Inrard C with van Hoof & Peel, 979
 (Tryp)
 — Peel E & Wanson M 103 (Hel)
 Inry A F X 1033 (Mal)
 Inry A J 989 (Leish)
 Inry E with Rodhain (807) (Tryp)
 Inry P S H & Rees, W H 676 (Heat Str)
 Inry Dustin M-J (846) (Vms)
 Inrt H & Noel G (406) (Leish)
 Ierbert D 713 (Pl)
 Ierman F with Jadin 350 (Mal)
 Iernandez Mora C (807) (Tryp)
 Iernandez Morales F with Culbertson
 Rose Oliver Gonzalez J & Pratt 924
 (Tryp)
 — & Gonzalez Barrientos G 228 (229)
 (Hel)
 — F & Maldonado J F with Pratt C K
 330 bis (Hel)
 — F with Oliver Gonzalez 830 (Hel)
 — & Pratt C K 434 (Hel)
 — Prat C K & Oliver Gonzalez, J 731
 (Hel)
 — with Santiago-Stevenson & Martinez
 902 (Am)
 — Suárez R M Pratt C K & Oliver
 Gonzalez J 218 (Hel)
 Iernando Orobos J 532 (Def Dis)
 Iernberg C A 15 951 (Mal)
 Iernott R M 133 (Ent)
 Iertzberg R 26 (Mal)
 Iess A D with Faus* & Young (158
 (Mal)
 — with Hall, 1042 (Mal)
 — & Keener G G Jr 850 (Mal)
 — with Penfound & Hall, 71 (Mal)
 — with Watson & Kiker 801 (Mal)
 Hess, W I with Haynes 460 (Der)
 Hesselbrock, W B with Gordon Marble
 Lippincott & Ellerbrook 173 (Mal)
 — with Lippincott Marble Ellerbrook
 Engstrom & Gordon 166 (Mal)
 — with — Paddock Rhees & Ellerbrook
 601 (Hel)
 Hewer T F 527 (Ys.)

Hewitt R I with Richardson Seager,
 Brook Martin & Maddux 289 (Mal)
 Bibbs R E, 607 (Def Dis)
 Hickling S with Etherington Roden &
 Sellick 163 (Mal)
 Hicks J D 460 (Der)
 Higashi A., with Welch Peters Bueding &
 Valk 1015 (Hel)
 Higby F R 446 (Hel)
 Highton R B with Haddow & Gillet* 516
 (YF)
 Hill E L & Ingraham S C 894 (Typh)
 Hill I G W 360 (Misc Dis)
 Hill K R 87 901 (Am)
 — Findlay G M & Macpherson A 94
 (Ys)
 Hill M A with Gordon 402 (Mal)
 Hills A G 169 (Mal)
 Hilmy I S with Khalil, 97 (Hel)
 Hilsen D with Marvish 615 (Oph)
 Hindle E 793 (Mal)
 Hinman E H & Biez M M 371 (Report
 etc)
 Hird A J (552) (Leish)
 Hitch J M 971 (Hel)
 Hitchcock D J & Rawson G W 84 (Am)
 — with — 716 (Am)
 Ho E A 189 (Leish)
 — Hsu T H & Soong T H 987 (Leish)
 Hoare C A 1045 (Tryp)
 Hocking K S 879 1038 (Mal)
 Hodges H H & Freeman N E 621 (Misc
 Dis)
 Hodgeson C H 578 (Bart)
 .
 .
 .
 Hogue M J (1102) (Pro.)
 Holden J R with Findlay Maegraith &
 Markson 501 (Mal)
 Rolland T 618 (Heat Str)
 Hollands R A & Palmer E D 439 (Hel)
 Hollenbeck A H (241) (Ent)
 Holler G & Zajitschek R 318 (Am) 1057
 (Typh)
 Hollis M D, (182) (Mal)
 Holton P 835 (Hel)
 Holz S with Gramer Doyeux (1092)
 (Haem)
 Honorato A with Gajardo-Tobar (832)
 (Misc Dis)
 Hood A 360 (Misc Ds)
 Hood M (836) (Lab)
 — " " " " " " " "
 .
 .
 Hopper J Jr with Monroe 246 (Lab)
 Hopwood M L with Piljoan Gerjovich
 Jachowski & Romne 369 (Ent)
 Horenstein B with Miyara Conte & Córca,
 815 (PL)
 van Horn P with Benedek Lewé Price &
 Koransky 458 (Der)
 Horner R with Elsdon Dew & Cameron 310
 (Am)

- Horton, R. K., with Westphal, 565 (Mal)
Hovanitz, W., 566 (Mal)
Howard, B., with Balamuth, 582 (Am)
Howard, J. W., with Flinn, Todd & Scott, 413 (Typh.)
Howell, C. A. H., 929 (Sp)
Howell, K. M., with Knoll, 524 (Am)
Howell, T. H., 1017 (Sp)
Hsu, K. C., 1008 (Hel)
Hsu, T. H., with Ho & Soong, 987 (Leish)
Hu, S. M. K., 1023 (Hel)
Huang, C. H. & Chu, L. W., 419 (Pl)
—, with —, 423 (Chl)
—, with —, Chang & Kao, 423 (Chl)
Huebner, R. J., 709 (Typh)
—, with Greenberg, Pellitteri & Klein, 707 (Typh)
—, Jellison, W. L. & Armstrong, C., 897 (Typh)
—, —, & Pomerantz, C., 411 (Typh)
—, Stamps, P. & Armstrong, C., 411 (Typh)
—, with Topping & Shepard, 70 (Typh)
Huff, C. G., 158 (Mal)
—, with Coulston, 970 (Mal)
—, —, Laird, R. L. & Porter, R. J., 1046 (Mal)
Hughes, A. C. C., 203 (Den.)
Hughes, C. O. & Brackett, S., 41 (Mal)
—, with —, Waletzky, Baker & Williams, 40 (Mal)
Hughes, T. P., with Mahaffy & Smithburn, 72 (Y.F)
—, with Perlowagora, 657 (Y.F)
Hull, R., Lovell, B. J., Openshaw, H. T. & Todd, A. R., (642) (Mal)
Humphreys, F. A. & Campbell, A. G., 758 (Reports, etc)
Hunninen, A. V., with Winkenwerder, Harrison, Billings, Carroll & Maier, 634 (Hel)
Hunt, R. & Davey, P., 694 (Mal)
Hunter, G. W., with Eyles & Warren, 637 (Hel)
—, Ingalls, J. W. & Cohen, M. G., 440 (Hel)
Hunter, J. K., 661 (Dys)
Hurlbut, H. S., Maple, J. D., Wilson, C. S., Fallander, S. R. & Husman, C. N., 881 (Mal)
—, with Travis, Maple & Hurlbut, 646 (Mal)
Husman, C. N., with Hurlbut, Maple, Wilson & Fallander, 881 (Mal)
—, with Travis, Maple & Hurlbut, 656 (Mal)
Hussain, A., with Sharma, 737 (Hel)
Hutchison, W. C. & Kermack, W. O., (877) (Mal)
Hynes, M., Ishaq, M. & Morris, T. L., 233 (Def. Dis)
—, —, Morris, T. L. & Verma, O. P., 744 (Haem)
—, —, & Verma, O. P., 744 (Haem)
- I.
- Ibarra Pérez, R. & González Prendes, M. A., 430, 590 (Lep)
—, with Oteiza Setien & Gonzalez Prendes, 95, 589 (Lep)
- Ibrahim, K. G., 618 (Oph.)
Iglesias, R., with Sabalette & Dominguez, 684 (R.F.)
Ignacio Baldo, J., Gil Yezpe, C., Mayer, M. & Pifano, C. F., 1077 (Hel)
Ignacio Chala H., J., 430 (Lep)
— & Lleras Restrepo, F., 823 (Lep.)
d'Ignazio, C., 193 (Typh.), (525) (Am)
— & Codeleonecni, E., (193) (Typh.), 52 (R.F.), 539 (Misc. Dis)
— & Collomb, H., (178) (Mal)
Ikejian, O., 572 quot., (885) (Tryp)
— & Mautner, L. S., 185 (Tryp.)
Incho, H. H., with Deonier & Jones, 289 (Mal)
—, with Jones & Deonier, 504 (Mal)
India, 252 (B.R.)
Indian Research Fund Association, 966 (Mal)
997 (Pl), 998 (Chl)
Infante Gómez, A., with Moreno Berdugo, 820 (R.F.)
Ingalls, J. W., with Faust & See, 331 (Hel)
—, with Hunter & Cohen, 440 (Hel)
—, with McMullen, 917 (Hel)
Ingalls, J. W. Jr., 442 (Hel)
Ingraham, H. S. & Lapenta, R. G., 212 (R.F.)
Ingraham, S. C., with Hill, 894 (Typh.)
Innes, E. M., with Davidson & Girdwood, 74 (Sp)
Innes, J. R. M., 877 (Mal)
Internat. J. Leprosy, 327 (Lep.)
Internat. Labour Review, (144) (Reports, etc 327 (Lep)
Iriarte, D. R., (626) (Ent)
Irondo, M., with Kouri & Fusté, (903) (Am)
Irons, J. V., with Cox & Tesar, 710 (Typh)
— & Hooper J. M., 710 (Typh)
—, Murphy, J. N. & Wolfe, D. M., 71 (Typh.)
—, with Topping & Shepard, 710 (Typh)
Ishaq, M., with Hynes & Morris, 233 (Def. Dis)
—, with —, — & Verma, 744 (Haem)
—, with —, — & Verma, 744 (Haem)
Ivanova, L. V., 161, 488 (Mal)
Iyengar, M. O. T., 564 (Mal)
Iyengar, N. K., with Bose & Mukerji, 18 (Leish)
Iyer, E. H., with Bani & Guha, (793) (Mal)
- J.
- Jackowski, L. A., with Pijoan, Gerjovich Hopwood & Romine, 369 (Ent)
Jackowski, L. A. Jr. & —, 368 (Ent)
Jackson, A. V., with Funder, 204 (Typh.)
Jackson, C. H. N., 47 (Tryp.)
Jackson, E. B., with Smadel, Bennett Rights, 513 (Typh.)
Jackson, H. & Oleesky, S., (321) (R.F.)
Jacoby, H., 88 (Am) (754), 937 (Misc. Dis)
Jacques, J. J. C., (1076) (Hel)
Jadin, J., with Giroud, 891 (Typh.)
Jadin, L. B. & Herman, F., 390 (Mal)
Jaffé, R. & Ferro R., 433 (Hel)
Jame, L., 178 (Mal)
— & Jude, A., (893) Typh.)

- none G Ferro-Luzzi G & Mara L,
 251 (Reports etc)
 nz, G J with Monteiro Coutinho & de
 Loureiro 340 (Def Dis)
 Olson W L with Greenberg & Pellitteri
 990 (Typh)
 — with Huebner & Armstrong 297 (Typh)
 — with — & Pomerantz 411 (Typh)
 oney E with Tullis Gersh McLimens &
 Vinson 675 (Typh)
 onings G H 278 (Mal)
 onison D B Helwig E B & Milstone
 J H (679) (Misc Dis)
 onson W F Moutia A & Courtois C
 1030 (Mal)
 or, C F 298 (Leish)
 orld M & Meulengracht E 457 (Haem)
 ormar H M 750 (Misc Dis)
 oratia K U 179 (Misc Dis)
 — & Mankid K K (663) (Am)
 orarides G 677 (Lab)
 oransen F A with Faget & Porge 775
 Dis (Lab)
 — with — — Fite Prejean & Gemar
 394 (Lab)
 ohn M B with Sharp 349 (Der)
 ohnson C G 545 625 (Ent)
 ohnson D H 200 (Typh)
 ohnson H A & Yates M W 1038 (Mal)
 ohnson H H with Bazemore Swanson &
 Hayman 559 (Mal)
 ohnson J G (1102) (Prot)
 ohnson R E with Kark Alton Pease Bean
 Henderson & Richardson 842 (Def Dis)
 ohnston C R St with Morrison 742 (Sp)
 ohnstone K F with Rice & Kearns 544
 (Ent)
 ohnstone H G with Anderson & Hansen
 819 (Am)
 ohnstone " D C 784 396 637 (Mal) 530
 (Hel)
 oids A T R 248 (Der)
 Jones B 479 (Ent)
 Jones E with Darby & Kaser 609 (Sp)
 — Warden h F & Darby W J 740
 (Sp)
 Jones H A with Deonier & Incho 779 (Mal)
 — Incho H H & Deonier C C 504 (Mal)
 — McCollough G T & Morton F A
 467 (Ent)
 — Titus H A & Oberg M W (487)
 (Ent)
 Jones M F & Brady F J 217 (Hel)
 Jones W E 213 1069 (Am)
 Jorzo A P with Tupac 278 (Misc Dis)
 Jope P M 747 (Haem)
 ordan H S with Cantrell 39 (Mal)
 ordan W S with Saunders & Bianco 108
 (Hel)
 ong M & Aguirre J A 115 (Def Dis)
 oseph A D 621 (Misc Dis)
 osephson E S Culwell W B & Trembley
 H L 1030 (Mal)
 — Udenfriend S & Brodie B B, 792
 (Mal)
 Univ Bombay (666) (Hel)
 nder rump, L 811 (Typh)
- Jude A with Groud 1057 (Typh)
 — with Jame (693) (Typh)
- K
- Kahn R J with Wheeler McDermott &
 Adler (642) (Mal)
 Kalela E with Becker & Burt's 177 (Mal)
 523 (Am)
 Kalayan B H 1006 (RF)
 Kalra S L 375 (Typh)
 Kamalov N G 668 (Hel)
 — Gordadze G N Tsutsunava T N
 — Javanishvili A O Kamalova A G &
 Bugulanishvili S M 224 (Hel)
 Kamalova A G with Kamalov Gordadze
 Tsutsunava Khirinishvili & Bugulanishvili
 224 (Hel)
 Kane C A with Most Lavietes London,
 Schroeder & Haymen 496 (Mal)
 Kantor F with Ritchken 1078 (Hel)
 Kao H C with Chu Huang & Chang 473
 (Chi)
 Kaplan F M with Kessel Moore & Schire
 son 524 (Am)
 Kaplan L I with Becler Reid & Boyd 280
 (Mal)
 — with Glenn Read & Becker 167 (Mal)
 — with Read & Becker 177 (Mal)
 — — — — — h Boyd M F 25 261
 (Mal)
 Kark R M Alton H F Pease E D Bean
 W B Henderson C R Johnson R E &
 Richardson L M 842 (Def Dis)
 Kark W 170 (Mal)
 Karmakat G with Rao 1080 (Haem)
 Kartman L 420 (Pi)
 — & da Silveira M M 38 (Mal)
 Kaser M M with Darby & Jones E 608
 (Sp)
 Katzenellenbogen J 539 (Misc Dis)
 Katzen B & Most H 440 (Hel)
 Kaump D H (243) (Lab)
 Kauntze W H 470 (Reports etc)
 Kean, B H with Shrager 170 (Mal)
 — & Taylor C E 166 (Mal)
 Kearns, C W with Rice & Johnstone 544
 (Ent)
 Keen, P 662 (Am)
 Keener G G Jr with Hess 880 (Mal)
 Kekwick, A Wright R J & Raper A B
 (674) (Def Dis)
 Kemp T A 1092 (Haem)
 Kendall D with Collard 903 (Am)
 Keneford J P & Simpson J O E (1037)
 (Mal)
 Kennedy J S 561 (Mal)
 Kerbrat G with Benard (514) (Typh)
 Kernack, W O with Hutchinson (877) (Mal)
 Kerr R W & Ra'erty W J 624 (Ent)
 Kershaw G R 749 (Misc Dis)
 Kervran P, 190 (Leish)
 — & Aretas R 1018 (Der)
 Kerwin J F with Campbell (34) (Mal)
 — with — La Forge & Campbell B K,
 (34) (Mal)
 — with — & Helbing (34) (Mal)
 — with — Sommers & Campbell S K,
 (34) (Mal)

- Kessel, J. F. & Moore, F. J. with Kaplan, F. M. & Schireson, R. 534 (Am)
 Kessler, A. 130 (Misc. Dis)
 Kevorkova, V. I. 671 (Hel.)
 Khalek, F. A., with Halawani, Nor-el-Din & Shaker, 99 (Hel)
 Khahl, M. B. & Hilmy, I. S. 97 (Hel)
 Khan, F. 234 (Vms)
 Khelevin, N. V., 680 (Ent.)
 Khizanishvili, A. O., with Kamalov, Gordadze, Tsutsunava, Kamalora & Bugulanishvili, 224 (Hel)
 Khoury, C. with Girardi, 125 (Der)
 Kiehl, E. & Siedek, H. 950 (Mal)
 Kierland, R. R. 499 (Mal)
 Kieser, J. A., 218 (Hel)
 Kiker, C. C., with Watson & Hess, 891 (Mal)
 Kikuth, W., with Schilling, I. 199 (Typh)
 King, E. J., 618 (Heat Str)
 King, F. E., with Acheson & Spensley, 964 (Mal)
 King, J. D., 262 (Mal)
 —, with Maegrath, Tottev. Adams & Andrews, 501 (Mal)
 King, W. V. & Hoogstraal, H. 543 (Ent)
 —, with Toffaleti, 958 (Mal)
 Kingery, R. M., with Bounds (429) (R. F)
 Kirby, F. G., 1030 (Typh)
 Kuk, J. B., 350 (Heat Str)
 Kurk, R., 988 (Leish)
 — & Corkill, N. L., 122 (Vms.)
 — & Sati, M. H., 885 (Leish)
 Kitchen, S. F., with Boyd, 560 (Mal)
 — & Putnam, P., 23 (Mal)
 Klein, I. F., with Greenberg, Pellitteri & Huebner, 707 (Typh)
 Khigler, I. J., with Birnbaum & Goldblum, 22 (Mal)
 Klinefelter, H. F., Jr., with Dell, 171 (Mal)
 Klyueva, N. G. & Roskin, G., (406) (Tryp)
 Knickerbocker, T. W., with Rakofsky, 236 (Der.)
 Knies, P. T., with Gordon, (659) (Pl)
 Knipe, F. W., with Soper, Casim, Rehl & Rubino, 877 (Mal)
 Knippling, E. F., 135 (Ent), (181) (Mal)
 —, with Madden & Linquist, 466 (Ent)
 —, with —, Schroeder & Linquist, 544 (Ent.)
 Knoll, E. W. & Howell, K. M., 524 (Am)
 Knowles, F. L., 700 (Mal)
 — & Smith, C. S., 399 (Mal)
 Kodicek, E., Carpenter, K. J. & Harris, L. J., 119 (Def. Dis)
 Koenigsfeld, E. G. H. & Nambiar, K. P. S., (659) (Pl)
 Koepfli, J. B., Mead, J. F. & Brockman, J. A., Jr., (964) (Mal)
 Koepke, J. A., with Cole, 468 (Ent)
 Koerber, R., with Durieux & Boiron, 991 (Y.F.)
 Kojevnikov, P. V., Dobrotvorsksya, N. V. & Latyshev, N. I., 940 (B.R.)
 Kolodny, M. H., with Denhoff, 748 (Ulc.)
 Koppisch, E., with Pomaes Lebron, Arbona & Morales Otero, 198 (Typh)
 Koprowski, H., 580 (Y.F.)
 —, with de Boer, Kunz & Cox, 712 (Den)
 — & Cox, H. R., 518 (Den.)
 Koransky, A., with Benedek, Lewe, Price & van Horn, 458 (Der.)
 Kotby, A., 614 (Oph.)
 Kouri, P., Iriondo, M. & Fusté, R., (903) (Am.)
 —, with Milanes, Curbelo, Rodriguez & Spies, 452 (Sp)
 Koussitasseff, 638 (Mal)
 Kraan, H., with Swellengrebel, 286 (Mal)
 Kreisberger, J., with Passouant, (638) (Rab)
 Kremer, C. B., with Elderfield, Kupchan, Birstein & Cortes, (964) (Mal)
 Krichovski, A. M., 675 (Der.)
 Krivonosova, Z. F., 161 (Mal)
 Krontovskaja, M. K., with Tovarnickij & Ceburkina, (301) (Typh.)
 Kuhlbeck, H., with Sadusk, 196 (Typh)
 Kuhn, H. S., 617 (Oph.)
 Kuitunen-Ekbaum, E. & Webster, D., 671 (Hel)
 Kuntz, R. E., 330 (Hel)
 — & Stirewalt, M. A., 434 (Hel)
 Kunz, L. J., with de Boer, Koprowski & Cox, 712 (Den.)
 Kuo, S. C., 331 (Hel)
 Kupchan, S. M., with Elderfield, Kremer, Birstein & Cortes, (964) (Mal)
 Kuzenok, A., with Olitzki & Czaczkes, 193 (Typh)
 Kyker, G. C. & McEwen, M. M., 757 (Lab)
 —, — & Cornatzer, W. E., 892 (Mal)

L.

- Lachmt, V., 704 (Typh)
 Ladell, W. S. S., 1097 (Heat Str)
 Laemmert, H. W., Jr., Ferreira, L. de C. & Taylor, R. M., 414 (Y.F.)
 —, with Fox, 1062 (Y.F.)
 van Laere, J., 394 (Mal)
 Laffer, N. C., with Sashun, Brown, McDowell & Boeing, 460 (Der)
 Lafferty, L. C., with Schnitzer & Buck, 185 (Tryp.)
 La Forge, R. A., with Campbell, K. N., Kerwin & Campbell, B. K., (34) (Mal)
 Lagodsky, H., with Launoy, 702 (Tryp)
 Laha, P. N., 585 (Am)
 Lahuri, D. C., with Hazra & Sokhey, (225) (Vms.)
 Laigret, J., 580 (Y.F.)
 Laird, R. L., with Huff, Coulston & Porter, 1046 (Mal)
 de Lajudie, P., with Floch, 322, 589, 724, (727) (Lep.), 922 bis (Hel), 1007 (Ys), (1054) (Tryp.)
 —, with — & Taillefer-Grimaldi, 93 (R.F.)
 Lal, R. B. & Seal, S. C., 144 (Reports, etc.)
 Lal, S. B., with Basu, (860) (Reports, etc.)
 Lalich, J. J., 1047 (Bl)
 Lam, F. K. & Price, S., 933 (Der.)
 Lambillon, J., 1034 (Mal)
 Landau, H. D., (463) (Misc. Dis.)
 Landau, J., with Feigenbaum, (618) (Oph.)
 Landquist, J. K., with Curd & Rose, (699) (Mal)
 —, with Rose & Curd, (964) (Mal)
 Landsborough, D. & Tunnell, N., 418 (Pl)

ne J with Cerqueira 1063 (Y.F.)
 ne W R 231 (Def Dis)
 nge H F 547 (Lab)
 Langen, C D 671 (Def Dis)
 ngridee W P., with Lewis 580 (Tryp)
 ngmilion J 506 (Lep)
 nna, G 160 163 (Mal)
 penta, R O with Ingraham 212 (RP)
 peyssonnie J & Lapeyssonnie L 295 (Tryp)
 ranja F S with Das & Nobrega 1551 (Tryp)
 rmande A., with Toulant 109a (Oph.)
 rsh J E Jr 223 668 (Hel)
 rsmann P., with Rodham, 184 (Mal)
 uf N (825) (Tryp)
 tyshet N I with Kojernakov & Dobro-
 morskaya 940 (BR)
 unoy L & Lagodsky H. 70 (Tryp)
 — & Pneur M Mile 569 (Tryp)
 urana R. 468 (Ent)
 urin E M Q 76 (Pl)
 urtherburg Bonjour M 310 (LP)
 ury G (813) (LP)
 vietes P H with Most Kane London,
 Schroeder & Raymen 406 (Mal)
 yron P with Beaudement & Aretas 727 (Lep)
 wrence D 209 (Am)
 wrence J with Coghill & Ballantine 718 (RP)
 ews S G 804 (Tryp)
 izarus A S & Gurnison J B 1064 (Pl)
 ells, H (342) (Haem)
 ilt, S S & Beck O H 916 (Hel)
 ried B., with Wanson, 131 (Ent)
 oun, J., Choussat, H. & Dubouchet G (525) (R.F.)
 — & Fabregoule AL (660) (R.F.)
 e Boudelles B with Swingsedaw & Masse (789) (Mal)
 e D H K. 1036 (Heat Str)
 — with Macpherson & Furlonger 934 (Heat Str)
 e D J with Woodhill, 775 bis (Mal)
 ech, R B 527 (Fa)
 tes, A D., 212 (R.F.)
 erson, F (458) (Fms)
 ehmann, H. with Walters & Rossiter 672 bis (Def Dis)
 — — — — —
 — — — — — of Dis.)
 — — — — — ang &
 — — — — — ph.)
 — — — — — P) 718
 — — — — — & Moury H. 718 (R.F.)
 errick, C B & MacGregor M E., 79 (Mal)
 ervice A. S., with Bianco Saunders & Cohn, 1034 (Mal)
 ervice H. D., 59 (Tryp.)
 — & Erlanger H., 395 (Mal)
 ervice N D & Harper P A., 953 (Mal)
 evinson, L B & Skadovskaja N S 888 (Leth.)

Levy M D with Arnold, 237 (Der)
 Lewe I with Benedek, Price Koransky &
 van Horn 458 (Der)
 Lewis C F & Musselman M M 531 (Def Dis)
 Lewis, D J., 606 (Y.F.)
 Lewis, E. A. & Lantridge W P., 980 (Tryp)
 Lewis, M N., 406 (Tryp)
 Lewis R. with Faust Heilbrunn & Murray 1067 (Am)
 Lewis, R A 317 (Am)
 Lewis Medical, Scientific & Technical Library 941 (BR)
 Lewthwaite R O Connor J L & Williams S E 410 (Tryp)
 Iabow A A MacLean P D Bumstead J H & Welt L G 351 (Ule)
 Iac Kian Joe with Bonne & Bras, 1013 (Hel)
 Lieou Y C with Reynal, 637 (Rab)
 Ialschutz J Umama A C & Vergara J J 76 (Mal)
 Lilhe R D 933 (Lab)
 Lincicum D R with Martin Graziani & Collins, 334 (Hel)
 Lindberg K 925 bis (Hel)
 Lindquist A W with Cristol & Haller 469 (Ent)
 — with Madden & Knippling 466 (Ent)
 — with — & Schroeder 1042 (Mal)
 — with — & Knippling 544 (Ent)
 Lindsay J K. 618 (Heat Str)
 — with Ciplan 618 (Heat Str)
 Linduska J P Cochran J H & Morton P A 681 (Ent)
 Lippincott S W with Christianson Gordon & Daniels, 24 (Mal)
 — with Gordon & Christianson 178 (Mal)
 — with — Marble Hesselbrook & Ellerbrook 173 (Mal)
 — Marble A Ellerbrook, L D Hesselbrook W B Engstrom W W & Gordon H H 166 (Mal)
 — Paddock F K Rhees M C Hesselbrook W B & Ellerbrook L D 601 (Hel)
 Lips, M with Vlacke & Camber 775 (Mal)
 Lisansky E T., with Downs & Harper 903 (Mal)
 — with Harper & Sasse 953 (Mal)
 Litsa P M 171 (Mal)
 Lisova A I Sofiyev M S & Eskin V A 876 (Mal)
 Little S C., with Watson & Murphey 916 (Hel)
 Liu P Y with Reimann, Chang Chu & Ou 423 (Crd.)
 Liu W T., 574 (Tryp)
 Livadas G A & Sphanos J C 259 (BR)
 Livesay H R. with Pollard Wilson & Woodland 574 (Tryp)
 — Wilson D J Pollard, M & Woodland J C 204 (Den)
 Lizondo J E. with Romana & Conejos 300 (Mal)
 Lleras Restrepo F., with Ignacio Chala 823 (Lep)
 Llopart, J with Chifflet (825) (Hel)
 Lobo R., 914 (Hel)
 Loeb R. P., 396 (Mal)

- van Loghem, J. J., (421) (Chl.), (630) (Reports, etc.)
 London, I. M., with Most, Kane, Lavietes, Schroeder & Haymen, 496 (Mal.)
 Lopes, D. M., 328 (Hel.)
 Lopez, G. G., Spies, T. D., Menendez, J. A. & Toca, R. L., 456 (Sp.)
 —, with —, Milanes & Aramburu, 845 (Sp.)
 Lopez-Chavez, G. J., (337) (Hel.)
 Losce, K., with Bernstein Pribyl & Lott, (964) (Mal.)
 Lott, W. A., with Bernstein, Pribyl & Losce, (964) (Mal.)
 —, with —, Stearns & Dexter, (964) (Mal.)
 —, with —, — & Shaw, (964) (Mal.)
 Loughlin, E. H. & Stoll, N. R., 335, 735 (Hel.)
 —, with —, Harris & Chenoweth, 444 (Hel.)
 de Loureiro, J. A., with Monteiro Coutinho & Janz, 340 (Def. Dis.)
 Lourie, E. M., 1048 (Tryp.)
 —, with Fulton, 403 (Tryp.)
 —, with Williamson, 48 (Tryp.)
 —, with — & Bertram, 970 (Mal.)
 Loutit, J. F., 743 (Haem.)
 Louveaux, J., 1060 (Typh.)
 Lovell, B. J., with Hull, Openshaw & Todd, (642) (Mal.)
 Lovett, W. C. D., 1102 (Ent.)
 Lowe, C. U. & Augustine, D. L., (754) (Misc. Dis.)
 Lubitz, J. M., with Ecker, (925) (Leish.)
 Lucké, B., 1048 (Bl.)
 Luckey, T. D., Moore, P. R., Elvehjem, C. A. & Hart, E. B., 119 (Def. Dis.)
 Ludwig, R. G. & Nicholson, H. P., 574 (Typh.)
 Luis Carri, E., 663 (Am.)
 Lum, L. C., 500 (Mal.)
 Lupasco, G., with Cantacuzène, 529 (Hel.)
 —, with Zotta, Radacovich, Cantacuzène & Teodoresco, 623 (Misc. Dis.)
 Luppova, N. N., 639 (Mal.)
 Lurye, A., 558 (Mal.)
 Lutterloh, C. H. & Shallenberger, P. L., 177 (Mal.)
 Luttermoser, G. W., 1078 (Hel.)
 Lwoff, M., with Nicolle, (885) (Tryp.)
- McDonald, S., 592 (Lep.)
 McDowell, F. & Varney, P. L., 851 (Misc. Dis.)
 McDowell, H. C., with Sashun, Brown, Laflin & Boeing, 460 (Der.)
 McEwen, M. M., with Kyker, 757 (Lab.)
 —, with — & Cornatzer, 802 (Mal.)
 McFadden, A. J. S., 739 (Def. Dis.)
 Macfarlane, D. G. & Macy, R. W., 97 (Hel.)
 Macfarlane, J. O., with Groupe & Nigg, 19 (Typh.)
 McGann, V. G., with Burrows, Mather & Wagner, 422 (Chl.)
 McGee, H. R., with Rostorfer, 567 (Mal.)
 MacGregor, M. E., with Levick, 789 (Mal.)
 MacGregor, R. B., 350 (Misc. Dis.)
 Machella, T. E., with Fine, R. & Burgoon, D. P., 557 (Mal.)
 MacInnes, D. G., 701 (Mal.)
 McIntyre, J. T., 618 (Heat Str.)
 Mackay, A. G., 720 (Lep.)
 McKee, R. W., with Anfinson, Geiman, Ormsbee & Ball, 1043 (Mal.)
 — & Geiman, Q. M., 649 (Mal.)
 —, with —, Anfinson, Ormsbee & Ball, 1043 (Mal.)
 —, Ormsbee, R. A., Anfinson, C. B., Geiman, Q. M. & Ball, E. G., 1043 (Mal.)
 McKendrick, A. J., with Young & Farr, (426) (R.F.), (448) (Hel.)
 Mackerras, I. M., 518 (Dan.), 642, 874 (Mal.)
 — & Aberdeen, J. E. C., 555 (Mal.)
 McKinney, W. L., Jr., with Monat, 90 (Am.)
 MacLean, with Liebow, Bumstead & Welt, 351 (Ulc.)
 McLennan, E. I., with Turner, Rogers & Matthaei, 371 (Lab.)
 Macleod, J. M. H. & Muende, I., 235 (B.R.)
 McLetchie, J. L., 971 tr. (Tryp.)
 McLamans, W. F. & Grant, C. W., 706 (Typh.)
 —, with Tullis, Gersh, Jenney & Vinson, 832 (Typh.)
 McMahon, J. P., 626 (Ent.)
 —, with Garnham, 1084 (Hel.)
 McMahon, M. C., with Wayson & Prince, 419 (Pl.)
 McMartin, R. B., with Dimson, 32 (Mal.)
 McMullen, D. B., 917 (Hel.)
 — & Graham, O. H., 917 (Hel.)
 — & Ingalls, J. W., 917 (Hel.)
 —, with Wright, Faust & Bauman, 830 (Hel.)
 Macpherson, A., with Hill & Findlay, 94 (Y's.)
 Macpherson, K., 686 (B.R.)
 Macpherson, R. K., Lee, D. H. K. & Furlonger, E., 934 (Heat Str.)
 McRoberts, G. R., 1026 (B.R.)
 Macy, R. W., with Macfarlane, 97 (Hel.)
 Madden, A. H., Lindquist, A. W. & Knippling, E. F., 466 (Ent.)
 —, Schroeder, H. O., Knippling, E. F. & Lindquist, A. W., 544 (Ent.)
 —, — & Lindquist, A. W., 1042 (Mal.)
 Maddux, H., with Richardson, Hewitt, Seager, Brooke & Martin, 289 (Mal.)
 Madsen, H., 110, 840 (Hel.)
 Maegrath, B., 121 (Sp.), 393 (Mal.)
 —, Brundrett, J. C., Rigby, J. D. & Shadden, R. A., 886 (Leish.)
 — & Havard, R. E., 44 (Bl.)

laegraith B. G. et al 27 28 31 498 bis 493
bis (Mal)
— with Findlay Marson & Hoden 501
(Mal)
— Tottey M M Adams A. R. D
Andrews W H H & King J D 501 (Mal)
la'rand R 213 (Lep)
lagrou E 417 (Pl)
labaffy A F with Haddow Smithburn &
Bugher 992 (YF)
— Smithburn K C & Hughes T P 72
(YF)
laiser J with Bang Hurston & Trager 281
503 696 (Mal)
— with Winkenwerder Hummeh Hon
rson Billings & Carroll, 834 (Hel)
Jais I A L with Tallant & Rakestraw 82
(Am)
Jaitra S R with Sarkar (846) (Vms)
— with — & Roy (846) (Vms)
Jajumder D N & Das Gupta C R 123
(Mal)
Jakar N 1010 (Hel)
— & Fawzy R M 1011 (Hel)
Jakari J G 279 (Mal) 298 (Leish)
Jakower H 1035 (Mal)
Jalamos B (188) (Leish)
Jalamund N Haymaker W & Custer R P
1097 (Heat Str)
Jalanga C with Seeler (399) (Mal)
Jalolson M E & Wishart F O 407
408 (Typh)
— with — 194 (Typh)
Jaldonado J F (568) (Am)
— with Hernandez Morales & Pratt 330
bis (Hel)
Jaloue R H, 511 (LeLh)
Janceaux A Bardenat C & Suin R 249
(Misc Ds)
— & Susini R (239) (Misc Ds)
Jandoul R & Pautrizel R 319 (Am)
Jansford J A 683 (Reports etc)
Janticalco G 627 (Lab)
Jankand K K with Jhatakia (663) (Am)
Jann, F G with Chapman & Gibson (1037)
(Mal)
— Naylor F T & Porter J W G (1037)
(Mal)
— & Porter J W G (1037) (Mal)
Jann I 1094 (Oph)
Janson Bahr P 360 (Misc Ds)
— & Clarke O 456 (Sp)
Janswa S L & 626 (Ert)
Janswell R D 43 (P2) (Mal)
— with Russell & West 372 (BR)
Japle J D with Hurlbut Wilson Fellan
der & Husman 881 (Mal)
— with Travis Hurlbut & Husman 646
(Mal)
Jaqrood M (735) (Hel)
Jara L with Jannone & Ferro-Luzzi, 251
(Reports, etc)
Jarano A & Nino F (1093) (Der)
Jarble A with Engstrom Gordon & Brun
stine 961 (Mal)
— with Gordon Dieuaide Christanson &
Dahl 963 (Mal)
— with — Lippincott Hesselbrock &
Ellerbrook 173 (Mal)

Marble A with Lippincott Ellerbrook
— — — — — 166 (Mal)
Iariaovski R 1 503 (Mal)
Markell E K Mullinger P E & Schneider
D J 597 (Hel)
Markham P S with Sober Davis & Riehl
292 (Typh)
Marks J L with Feinstein & Yesner 66
(Typh)
Markson J L with Findlay 884 (Bl)
— with — Macgrath & Holden 501
(Mal)
Maron T 1035 (Mal)
Marrie C D (986) (Leish)
Marriott H L 260 (Misc Ds)
Marrugat O L (1082) (Hel)
Marsden A T H 88 (Am) 303 (Misc Dis)
Marshall E K Jr & Dearborn E H 292
bis (Mal)
— with — 493 568 (Mal)
Martin A P 140 (Reports etc)
Martin C with Fontan Vergar & Moullès
638 (Mal)
Martin F with Richardson Hewitt Seager
Brooke & Maddux 289 (Mal)
Martin L A with Blanc (613) (Typh)
— with — & Maurice 898 (Typh)
— with Maurice & Blanc 709 (Typh)
Martin W B Graziani J G Collins J &
Lancieux D R 334 (Hel)
Martinez E C with Bartiag-Stevenson &
Hernandez Morales P 902 (Am)
Marucci P E with Elmendorf Griffin
Mayer & Ryan 485 (Ent)
Marvin H N with Red n 784 (Mal)
Mas Hamani S G (179) bis 955 (Mal)
Mason P K Daniels W B Paddock F K
& Gordon H H 732 (Hel)
Masse L with Sayngedauw & Le Bourdellès
(739) (Mal)
Massoud F (618) (Oph)
Mather A N with Burrows Elliott &
Wagner 422 (Chl)
— with — McGann & Wagner 472
(Chl)
Mather K 244 (Lab)
Mathis W V Ferguson F F & Summons
S W 644 (Mal)
Mathya V Cuvelata S & Aguirre Garrido
J 279 (Mal) 443 (Hel) (663) (Haem)
Matilla Gomez V 255 (Ert)
Matthaei, E with Turner McLennan &
Rogers 371 (Lab)
Mattingly P F 365 (Ent)
Maurice A with Blanc & Martin 709 898
(Typh)
Mautner L S with Ikejani 123 (Tryp)
May E L 729 (Hel) (905) (Am)
Mayer M with Ignacio Baldo Gil Yopez &
Pifano 1077 (Hel)
Mayer M M & Heideberger M 172 (Mal)
Mazzotta L with Bozicevich Donovan Daz
& Padilla 689 (Hel)
Mead J F with Koepf & Brockman (964)
(Mal)

- Medina, H. with Percira, 188 (Leish.)
 Medulla, C., (598) (Hel.)
 Megaw, J. W. D., 300 (Typh.)
 de Meillon, B., 469 (Ent.)
 — & Golberg, L., 523 (R.F.)
 Melira, J. A., (529), (825) (Hel.)
 —, with de Oliveira, 668 (Hel.)
 de Meira, M. T. V. & Couto, A. de M. F., 1014 (Hel.)
 Meleney, H. E., 492 (Mal.)
 — & French, R. S., 410 (Typh.)
 —, with Snyder, 532 (Am.)
 Mellanby, K., 240, 364 (Ent.)
 de Mendonça, F. C. & Cerqueira, N. L., 955 (Mal.)
 Menendez, J. A., with Lopez, Spies & Toca, 456 (Sp.)
 Menon, I. G. K., 832 (Misc. D's.)
 —, with Ahuja, Brooks & Veeraraghavan, (845) (Vms.)
 Menoz, K. P., with Cochrane & Pandit, 322 (Lep.)
 Menyasz, E. & Nicolas, E., 892 (Typh.)
 Mer, G., Birnbaum, D. & Aroub, A., 542 (Ent.)
 Merchant, D. J., (806) (Tryp.)
 Merchant, S. M., (457) (Haem.)
 Mercier, C., with Roux, 207 (Pl.)
 Merkel, W. C., 172 (Mal.)
 Merskey, C., 1070 (R.F.)
 Mesrobian, L., (349) (Der.)
 Messini, M., (512) (Leish.)
 Meulengracht, E., with Jersild, 437 (Haem.)
 Meyer, E., with Baker, Sommer, Foster & Meyer, 712 (Pl.)
 Meyer, H., 968 (Mal.)
 Meyer, K. F., 816 (Pl.)
 —, with Baker, Sommer, Foster & Meyer, 712 (Pl.)
 Meyer, R., 195 (Typh.)
 Meyer, S. L., with Elmendorf, Marucci, Griffin & Ryan, 466 (Ent.)
 Meyers, M. C., with Bethell, Andrews, Swendseld, Bird & Brown, (533) (Haem.)
 Mezey, C. M. & Fowler, R., (350) (Der.)
 Michael, P., 210 (Am.)
 Mider, G. B., Smith, F. D. & Bray, W. E., Jr., 610 (Der.)
 Miescher, G., 347 (Der.)
 Milanés, F., Cumbelo, A., Rodriguez, A., Kouri, P. & Spies, T. D., 452 (Sp.)
 —, with Spies, Lopez & Aramburu, 845 (Sp.)
 Miller, J. F., with Elnhorn, 215 (Hel.)
 Mills, K. C., with van den Ende, Stuart-Harris, Fulton, Niven, Andrews, Begz, Elford, White, Hawley, Hamilton & Thomas, 472 (B.R.)
 Millsbaugh, D. D. & Fuller, H. S., 705 (Typh.)
 Milstone, J. H., with Jennison & Helwig, (679) (Misc. Dis.)
 Ministry of Supply, (136) (Ent.)
 Mirvish, I. & Hulsdon, D., 615 (Oph.)
 Mitchell, J. G., with Heath, 754 (Ent.)
 Miyara, S., Conte, D., Horenstein, B. & Corica, P., 815 (Pl.)
 Moissi, C., with Baltazard & Bahmanyar, 905 (R.F.)
 —, with —, — & Seydian, 906 (R.F.)
 Mohamed, A. H., with Solman, 458 (Vms.)
 Mohapatra, G. S., (715) (Am.)
 Moiser, B., 321, 725 (Lep.)
 Molina, R. D. & Santos, H. A., (669) (Hel.)
 Molnar, G. W., Toblin, E. J., Gosselin, R. E., Brown, A. H. & Adolph, E. F., 461 (Hrat Str.)
 Moloshok, R. E., with Daek, 662 (Am.)
 Mom, A. M., 594, 1074 (Lep.)
 — & Bernal, M., 596 (Lep.)
 Monat, H. A. & McKinney, W. L., Jr., 90 (Am.)
 Monod, T., 737 (Reports, etc.)
 Monroe, L. & Hopper, J., Jr., 245 (Lab.)
 Monteiro, A. M., Coutinho, H., Janz, G. J. & de Loureiro, J. A., 240 (Def. Dis.)
 Montel, R. & Giroud, P., 322 (Lep.)
 Montessori, P. P., 123 (Der.)
 Montestruc, E., 641 (Mal.)
 Montoya, J. A., (301) (Typh.)
 Moore, F. J., with Kessel, Kaplan & Schireson, 524 (Am.)
 Moore, P. R., with Luckey, Elvehjem & Hart, 119 (Def. Dis.)
 Moorehead, M. T., 113 (Hel.)
 Mosser, H., 191 (Typh.)
 Morales Otero, P., with Pomales Lebron, Arcona & Koppisch, 198 (Typh.)
 Morcos, F., with Halawani & Baz, 792 (Mal.)
 Moreau, with Ouary, 333 (Uic.)
 Morehouse, W. G., with Burrows & Freed, 926 (Hel.)
 Moreno Berdugo, J. & Infante Gómez, A., 820 (R.F.)
 Moretti, G. F., with Bonnam & Dubois, 243 (Haem.)
 Morgan, H. R., Stevens, D. A. & Snyder, J. C., 808 (Typh.)
 Morgan, R. E., Sheppard, R. R. & Barnett, G. S., 1009 (Mal.)
 Morkos, P., with Halawani & Baz, 698 (Mal.)
 Morrill, A. W., Jr., with Dews, 134 (Ent.)
 Morris, K. R. S., 51 (Tryp.)
 Morris, T. L., with Hynes & Ishaq, 233 (Def. Dis.)
 —, with —, — & Verma, 744 (Haem.)
 Morrison, R. J. G. & Johnston, C. R. St., 742 (Sp.)
 Mortimer, D. A., (165) (Mal.)
 Morton, F. A., with Jones & McCullough, 467 (Ent.)
 —, with Linducka & Cochran, 681 (Ent.)
 Morton, T. C., 314 (Am.)
 Moshkovski, S. D., 956 (Mal.)
 Moong, H., 1056 (Typh.)
 Most, H., with Baroudy, 333 (Hel.)
 —, with Bartter, Cowie, Ness & Forbush, 1012 (Hel.)
 —, with Eyles, 538 (Hel.)
 —, Hayman, J. M., Jr. & Wilson, T. B., 443 (Hel.)
 —, Kane, C. A., Lavietes, P. H., London, I. M., Schroeder, E. F. & Hayman, J. M., 496 (Mal.)
 —, with Katzin, 440 (Hel.)
 Mostajo, B., with Macchiavello & Mostajo, 713 (Pl.)
 Mostajo, B., Jr., with Macchiavello & Mostajo, 713 (Pl.)
 Moulder, J. W., (1052) (Tryp.)
 Moulès, A., with Fontan, Verger & Martin, 638 (Mal.)

M. J. A. with Jepson & Courtont, 1030 (Mal.)
 Meller M. G. with Carlson & Busell, 39 (Mal.)
 Mende I. with Macleod, 255 (B.R.)
 Mendenhall C. P. W. (364) (Ent.)
 M. E. 377 824 1073 (Lep.)
 M. J. A. & Bhadani N. V. 835 (Hel.)
 ——— & Narain S. 599 (Hel.)
 ——— & Chaudhuri, 970 (Hel.)
 Mukherji, B. with Bose & Tyengar, 129 (Leish.)
 Mukherji, B. N. 494 (Mal.)
 Mukherjee S. P. with Guha, 558 (Mal.)
 Mukherji, N. with Dharmendra, (723) (Lep.)
 Muller P. E. with Markell & Schneider, 597 (Hel.)
 Mules Houwer A. W. (100) (Oph.)
 Munro J. & de Freitas G. 290 (Leish.) 571 (Tryp.)
 Muncie, N. T. (305) (Y.F.)
 Munn, R. V. 1971 (Lep.)
 Murnaghan P. 232 (Mal.) 360 (Misc. Dis.) 527 (Is.)
 Murre P. with Watson & Little, 916 (Hel.)
 Murre J. N. with Irons & Wolfe, 710 (Typh.)
 Murray A. J. 1010 (Hel.)
 Murray M. L. with Fausch, Heilbrunn & Lewis, 1067 (Am.)
 Murray N. L. with Gear, 702 (Typh.)
 Murray R. E. 478 (B.R.)
 Murray Lyon, R. M. (714) (Am.)
 Mustrate A. J. 58 (Typh.)
 Mueselman M. M. with Lewis, 531 (D.) (Dis.)

Nagaty H. F., (667) (Hel.)
 Najera Arguilo L. 179 bis (Mal.)
 Najera L., 241 (Ent.)
 Nambiar K. P. S. with Hoeningfeld, (639) (Pl.)
 Nandor L. E. 360 (Misc.) 790 (Mal.)
 ——— & Das Gupta C. R. 1104 (B.R.)
 Nandan S., with Mukerji & Bhadani, 599 (Hel.)
 Nandini J. E., (674) (Def. Dis.)
 Nandini K. S., with Bhatt, (660) (Hel.)
 ——— with Patel, (666) (Hel.)
 Nasir M., (608) (Hel.)
 Nassiruddin, M., with Rao, 16 (Mal.)
 Ne Narville (589) (R.F.)
 Naval Medical Research Institute, 330 (Hel.)
 Naylor P. G., with Mann & Porter, (1037) (Mal.)
 Neal, R. A., (663) (Am.)
 Negherbon W. O., with Shih Lu Chang, 1056 (Leish.)
 Neghme, A. & Faiguenbaum J., 734 (Hel.)
 Nelson, C. T., 705 (Typh.)
 Nelson, E. C., Webb J. E., Bayliss, M. & Starkey G. S., 229 (Hel.)
 Nelson, E. M., with Suarez, Welch, Heinle & Suarez, 607 (Sp.)
 Nes, A. T., with Bartlett Cowie Most & Forbush, 1012 (Hel.)
 Nettel, P. R., (671) (Hel.)
 Neujean, G., 56, 57, 58 (Typh.)
 ——— & Doucet, G., 57 (Typh.)

Neres J. A. & Costa O. G., 610 (Der.)
 Newton W. L. & Pratt, I., 337 (Hel.)
 ——— with ———, 104 (Hel.)
 Ng, D. V., with Galliard, (695) (Mal.) 73 (737) (Hel.)
 Nicholson, H. P., with Ludwig, 574 (Typh.)
 Nemegeers L. with Witteboel, 427 (R.F.)
 Nigeria, 971 ter (Tryp.)
 Nize C. with Groupe & Macfarlane, 197 (Typh.)
 Nio P. F. with Marano (1093) (Der.)
 Nio P. L. (125) 349 (D. r.)
 Nisbet, T. W. (877) (Mal.)
 van Nitsen, R. 634 (B.R.)
 Niven, J. S. P. with van den Ende Stuart Harris, Fulton, Anderson, Bagg, Elford White Hawley Mills Hamilton & Thomas, 42 (B.R.)
 Nohrega G. with Das Z. Laranja, (631) (Tryp.)
 Noehren, T. H. 23 (Mal.)
 Noel, G. with Hentz, (406) (Leish.)
 Nogueira, J. P. P. with Bastos da Luz, (934) (Der.)
 Nolan, D. E. with Warshawsky & Abramson, 317 (Am.)
 Nor-el Din, G. with Halawani, Shaker & Alia, 99 (Hel.)
 Norman, A. P., 54 (Leish.)
 Norval L. 633 bis (Typh.)
 Nouchy with Benhamou & Sebah, 228 (Misc. Dis.)
 Noury H. with Levaditi & Vaisman, 718 (R.F.)

O

Ober R. E. 448 (Hel.)
 Oberg M. W., with Jones & Titus, (457) (Ent.)
 Oberle G. 159 (Mal.)
 O'Brien, H. R. 250 (Reports, etc.)
 O'Brien, T. P. (547) (Reports, etc.)
 O'Connor J. L., with Leithwaite & Williams, 410 (Typh.)
 O'Donnell, J. E. 340 (Def. Dis.)
 Odum E. P. & Sumnerford, W. T., (457) (Ent.)
 Oleesky S. with Jackson, (321) (R.F.)
 Olitzki L. & Buechler E., 186 (Typh.)
 ——— with Bernkopf & Stuczynski, 587 (R.F.)
 ——— Gaczkes, J. W. & Kuzenok, A., 190 (Typh.)
 de Oliveira, A. 235 (Mal.)
 de Oliveira H. L. & Meira J. A., 663 (Hel.)
 de Oliveira, P. P. 96 (Hel.)
 de Oliveira Castro G. M., 1072 (Lep.)
 Olver-Gonzalez, J., 226 729 (Hel.) 529 (Mal.)
 ——— with Culbertson & Rose, 912 (Hel.)
 ——— with ——— Hernández Morales & Pratt, 924 (Hel.)
 ——— & Hernández Morales, F. 830 (Hel.)
 ——— with ——— (729) (Hel.)
 ——— with ——— & Pratt, 434 731 (Hel.)
 ——— with ——— Suarez & Pratt, 218 (Hel.)
 ——— with Pratt, 826 (Hel.)

- Olle, R. G. & Hector Cambiaso, R., 1095 (Oph.)
 Olson, B. J., Bell, J. A. & Emmons, C. W., 848 (Der.)
 Olson, T. A., (131) (Ent.)
 —, with Davis & Pollard, 303 (Typh.)
 Oman, P. W. & Christenson, L. D., 953 (Mal.)
 Onay Bey, A., 1011 (Hel.)
 Openshaw, H. T., with Hull, Lovell & Todd, (642) (Mal.)
 Oppel, T. W., with Weber & Raymond, 205 (Den.)
 Oppenheim, E., with Willett, 460 (Der.)
 Oppenheim, J. M., Whims, C. B. & Frisch, A. W., 449 (Hel.)
 Orenstein, A. J., (71) (YF)
 de Oreo, G. A., (458) (Vms.)
 Orgain, H., with Gartrell, 20 (Mal.)
 Ormsbee, R. A., with Anfinson, Geiman, McKee & Ball, 1043 (Mal.)
 —, with Geiman, Anfinson, McKee & Ball 1043 (Mal.)
 —, with McKee, Anfinson, Geiman & Ball, 1043 (Mal.)
 Orozco, G., with Ruiz Sanchez & Ponce de Leon, 304 (Typh.)
 Osburn, L. W., (513) (Typh.)
 Osorno-Mesa, E., with Anderson, 309 (YF)
 Ostroumov, V. G., 904 (Am.)
 Osvaldo Curci, A., with Federico Guillot, 591 (Lep.)
 Oteiza Setien, A., Ibarra Perez, R. & Gonzalez Prendes, M. A., 95, 589 (Lep.)
 Ott, W. H., with Seeler, 41, 185 (Mal.)
 Otto, G. F., with Donaldson (335) (Hel.)
 — & Maren, T. H., 1083 (Hel.)
 Ou, Y., with Reimann, Chang, Chu & Liu, 423 (Chl.)
 Ouay & Moreau, 353 (Ulc.)
 Oz, T. V., 59 (Typh.)
- P.
- Packalén, T., 809 (Typh.)
 Packchianian, A. & Price, T. G., 429 (R.F.)
 — & Sweets, H. H., Jr., (651) (Tryp.)
 Paddock, F. K., with Lippincott, Rhees, Hesselbrock & Ellerbrook, 601 (Hel.)
 —, with Mason, Daniels & Gordon, 732 (Hel.)
 Padilla, B. E., 192 (Typh.)
 Padilla, E., with Bozicevich, Donovan, Mazzotti & Diaz, 669 (Hel.)
 Padron Ibarbia, F., (715) (Am.)
 Page, F. T., 424 (Am.)
 Page, I. H., with Corcoran, 539 (Misc. Dis.)
 Page, S. G., Jr. & McCall, J. V., Jr., 396 (Mal.)
 Palmer, E. D., 731 (Hel.)
 —, with Hollands, 439 (Hel.)
 Pampana, (274) (Mal.)
 Pandit, C. G., with Cochrane & Menon, 322 (Lep.)
 Panja, D., Dey, N. C. & Ghosh, L. M., 1018 (Der.)
 Panja, G., 214 (Lep.)
 — & Das, N. N., 999 (Chl.)
 — & Ghosh, S. K., 998 (Chl.)
 Paquier, P., with Ceccaldi, Trunqueter, Pelsier and Varenus, 949 (Rab.)
 Para, M., 628 (Lab.)
 Pardo-Castello, V., Tiant, F. R. & Piñey R., 1074 (Lep.)
 Parikh, R. O., with Viswanathan, 793 (Mal.)
 Parrinello, G., 297 (Leish.)
 Parrot, L. Catanel, A. & Collignon, E., (Mal.)
 — & Durand-Delacere, R., (754) (Ent.)
 — & Habibi, A., (132) (Ent.)
 — & Wanson, L., (132) (Ent.)
 Parvis, D., 1002 (Am.)
 Passfield, G., with Woodhill, 365 (Ent.)
 Pasquet, P. & Haudon, J., 127 (Heat Str.)
 Passouant, P. & Kreisberger, J., (638) (Rab.)
 Patel, J. C., (609) (Haem.)
 Patel, N. Z. & Nargund, K. S., (666) (Hel.)
 Patino Camargo, L., Cortés, E., Garcia, V., Santos, J., Zozaya, C., Rueda, V. & Ro del Valle, J., 1037 (Mal.)
 Paton, J. P. J., Peck, C. R. & van de Schaa A., 622 (Misc. Dis.)
 Patterson, H. M., 1007 (R.F.)
 de Paula, A., 201 (Typh.)
 Paulley, J. W. & Aitken, G. J., 120 (Sp.)
 Pautrizel, R., with Mandoul, 319 (Am.)
 Pavlov, P., (1020) (Ent.)
 Parlovsky, E. N., 376 (B.R.)
 Payne, E. H., Balthazar, E. & Bezerra, D. A., 502 (Mal.)
 —, — & Fernandes, J. S., 502 (Mal.)
 — & Sanches, A., 692 (Mal.)
 Payne, G. C., with Gahan, 880 (Mal.)
 Payzan, S., 703 (Typh.), 717 (Am.)
 Peacock, W. C., with Ferrebee & Gibson, (Mal.)
 Pearce, E., with Culbertson, 229 (Hel.)
 Pease, E. D., with Kark, Alton, Benson, Henderson, Johnson & Richardson, 8 (Def. Dis.)
 Peck, C. R., with Paton & van de Schaa 622 (Misc. Dis.)
 — & Zwanenburg, T., 622 (Misc. Dis.)
 Peck, J. L., Jr., with Stoll & Chenoweth, 73 (Hel.)
 Peel, E. & Chardome, M., 339 (Hel.)
 —, with Henrard & Wanson, 103 (Hel.)
 —, with van Hoof & Henrard, 979 (Tryp.)
 — & Rodham, J., 967 (Mal.)
 Pegullo, J., with Raynaud, 93, (93) (R.F.)
 —, with — & Aubin, (718) (R.F.)
 Pehssier, A., with Ceccaldi, Paquier, Trunqueter & Vargues, 949 (Rab.)
 Pélissier, A., 975 (Tryp.)
 Pellitteri, O., with Greenberg, Klein & Huebner, 707 (Typh.)
 Pellitteri, O. J., with Greenberg & Jellison 990 (Typh.)
 Peltier, (1063) (YF.)
 Peltier, M., 417 (Y.F.), (426) (R.F.)
 Pendse, G. S., Gokhale, V. G., Phalnikar N. L. & Bhude, V. B., (681) (Ent.)
 Penfound, W. T., Hall, T. F. & Hess, A. D., 21 (Mal.)
 Penn, G. H., (754) (Ent.)
 Pereira, C. & Medina, H., 188 (Leish.)
 Pereira, J. M., with Fonseca, Cambourneac Pinto & Cunha, 487 (Mal.)
 Peretira, M. de C., 1019 bis (Ent.)
 Perez-Santiago, E., with Diaz-Rivera & Santos, 199 (Typh.)

- Rigby J D with Macgregal Brundrett & Sladden 886 (Leish)
 Rigdon, R H 884 (Mal)
 — with Fletcher 42 (Mal)
 — & Marvin H N 894 (Mal)
 — & Rostorfer H H (883) 883 (Mal)
 — & Varnadoe N B 505 (Mal)
 Rights F L with Smadel Jackson & Bennett 513 (Typh)
 van Riper W 123 (Vms)
 Ripley H S 200 (Typh)
 Ritchken J & Kantor F 1078 (Hel)
 Robbins, F C, Gauld, R L & Warner P B 63 (Typh)
 — & Ragan C A 62 (Typh)
 — & Rustigian R 63 (Typh)
 — — Snyder M J & Smadel J E 64 (Typh)
 Roberts E W 1001 (Am)
 Robertson A G with Wilson 1039 (Mal)
 Robertson E G 624 (Prot)
 Robertson K 428 (RF)
 Robertson K M 1068 (Am)
 Robertson W M & Findlay G M 747 (Haem)
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